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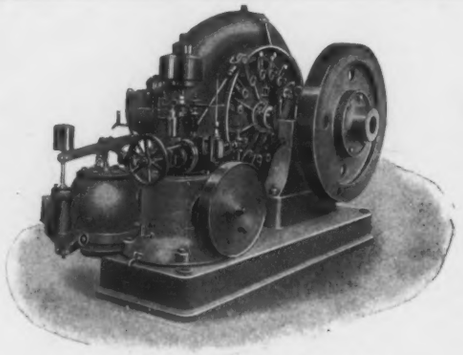

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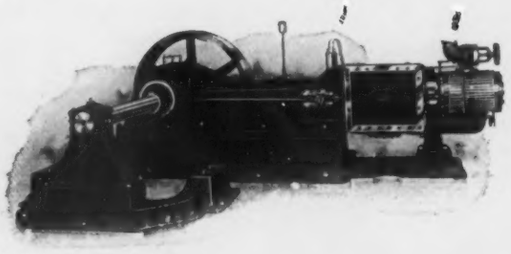

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VOLUME XXIII SAN FRANCISCO, DECEMBER 4, 1909 NUMBER 23

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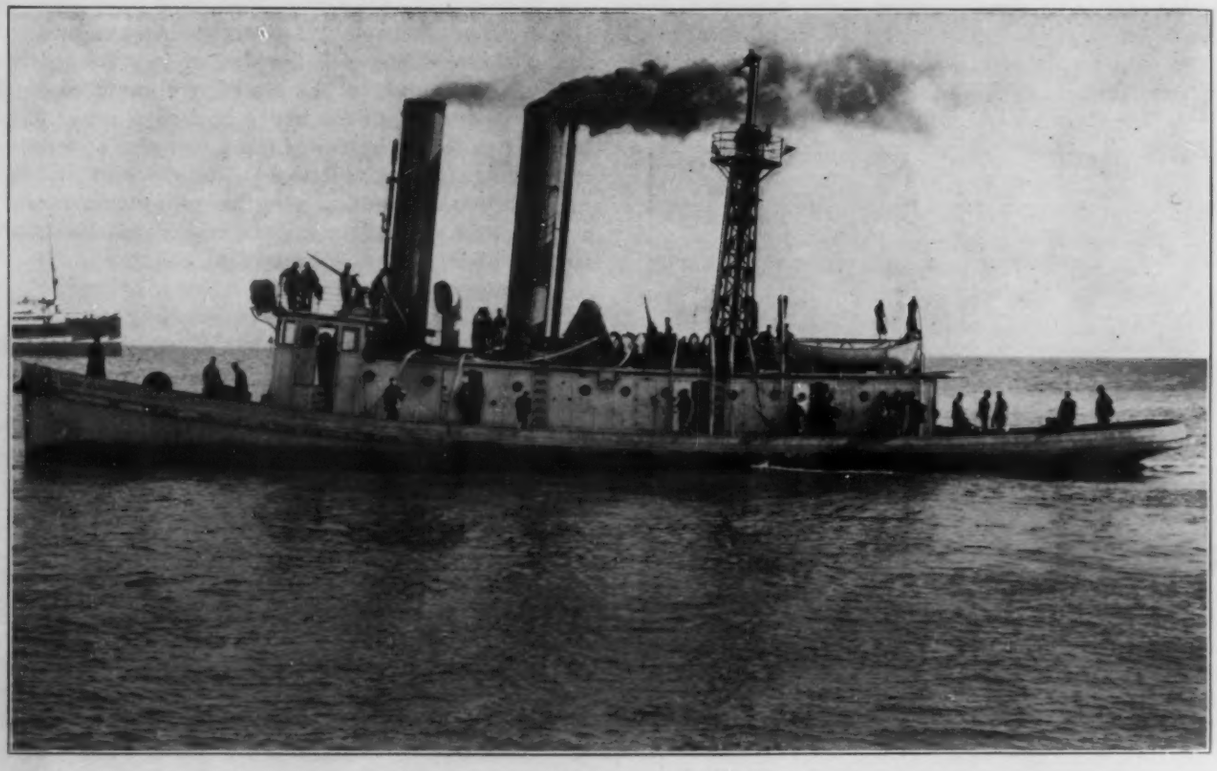
THE SAN FRANCISCO FIRE BOATS

As a part of a comprehensive system of fire protection for the city of San Francisco, the Risdon Iron & Locomotive Works have just completed two twin screw steel boats, equipped with apparatus for fighting fire along the water front. These sister ships, the "Dennis T. Sullivan" and "David Scannell," are now under test, the view on the next page showing the "David Scannell" in action during the builders' test.

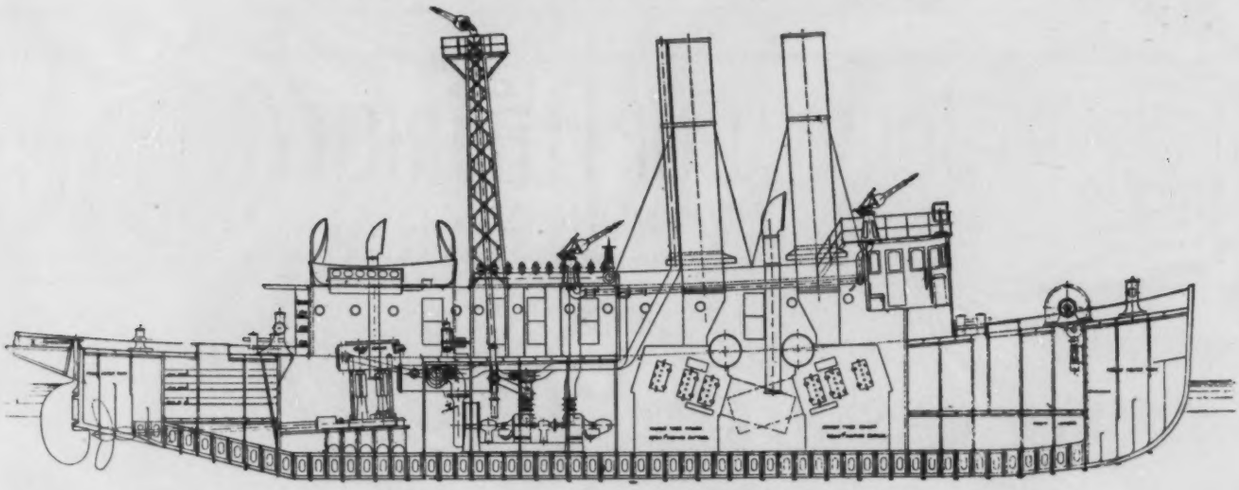


One of the New San Francisco Fire Boats

The boats are each 129 ft. long with 26 ft. beam and 12 ft. 9 in. depth, and are equipped with three main turret nozzles, one above the pilot house, one amidships above the deck house and one mounted on a structural steel tower. Besides these there are twenty valves for auxiliary streams, which are placed amidships above the deck house, and in addition there are two portable 2-in. nozzles.

Water is furnished by two sets of fire pumps, each set consisting of two two-stage centrifugal pumps direct connected to, and driven by, 600 h. p. Curtis steam turbines. These pumps may be operated either in parallel or in series, each pump delivering 2250 gallons per minute against a discharge pressure of 150 lbs., which is equivalent to 1450 gallons at 150 lb. pressure when operated in parallel and 2250 gallons per minute at 300 lb. pressure when operated in series.

The two main engines for propelling each vessel are of the compound, direct acting, inverted cylinder type, with 13-in. high pressure cylinder and 28-in. low pressure cylinder, being fitted with Stevenson link motion and steam reversing gear. In the trial trip, the "Dennis T. Sullivan" developed a speed of thirteen miles per hour and the "Scannell" the same.



Cross Section of San Francisco Fire Boat

Steam is furnished by two Babcock and Wilcox water tube boilers with a combined heating surface of 5400 square feet, being constructed for a working steam pressure of 200 lb. per sq. in. Oil is used as fuel. These boats were built in the ship yards of the Risdon Iron Works, who also built the main engines and all auxiliaries. The centrifugal pumps were manufactured by the Byron Jackson Iron Works, San Francisco, and the steam turbines by the General Electric Company. The turbines are operated under steam pressure

David Scannell in Action

of 150 lb. per sq. in., and are provided with an automatic governor driven through positive gear from the turbine shafts. The turbines exhaust into surface condensers, having 1350 sq. ft. of cooling surface, and maintaining a vacuum of 27 in. Circulation is provided by a Risdon centrifugal pump, having a capacity of 2000 gallons per minute, and direct connected to a single cylinder vertical Risdon engine.

The main and auxiliary feed pumps were made by the Dow Pumping Engine Company of San Francisco, being of the vertical single piston type with a 10-in. steam cylinder and 7-in. water cylinder, being designed for a working pressure of 200 lb. per sq. in. The pumps are two in number, one being placed alongside the feed water tank, so as to be capable of use as a main feed pump to draw from the feed water tank, and discharge to the main feed line, and the other connected so as to draw from the fresh water tanks or sea and discharge through the main or auxiliary feed line. The two air pumps are of the vertical twin beam pattern, with two 8-in. steam cylinder and two 14-in. air cylinder. These were also manufactured by the Dow Pumping Engine Company. These vessels are also fitted with donkey pumps, fuel oil pumps, injectors, steel windlass and steam steering engine.

The three main fire nozzles, or monitors, deliver a 3-in. stream and, as was stated, are mounted on the pilot house, on the deck house, and on a water tower. The water tower is 26 ft. high above the upper deck, consisting of a square latticed column with a 4-ft. base and 2-ft. top. In addition to the 3-in. monitors, there are two 2-in. portable monitors, which may be coupled to deck plates, there being two on either side.

The boats are electrically lighted, being provided with an 18-in. Carlisle & Finch searchlight and forty-six 16 c. p. incandescent lamps. Current is furnished by a 10 k. w., d. c. Westinghouse dynamo direct connected to a vertical single cylinder Ohmon engine. The switchboard is a single panel enameled slate fitted with the usual instruments.

Examination for first-class Steam Engineer is announced by the United States Civil Service Commission on January 5, 1910, to fill a vacancy in the position of engineer, $1,600 per annum, in the National Museum, Washington, D. C., and vacancies requiring similar qualifications as they may occur. The equipment in the National Museum building consists of four Geary water-tube boilers fired with Taylor mechanical stokers, three 150 k. w. and one 75 k. w. Westinghouse three-wire D. C. generators, all direct connected to Ridgway four-valve engines for light and power, several motors for various purposes, six Otis electric elevators, a vacuum cleaning system, and all auxiliary apparatus for a well-designed power plant of this capacity. The person appointed to this position will be in charge of the power plant in the National Museum building, and will also be expected to act in an advisory capacity upon all questions of an engineering character for the Smithsonian Institution. While graduation from a technical school is not necessary, it will be given due consideration in the rating of the subject of education and experience.

THE CONSUMERS' LIGHT & POWER PLANT.

The power plant in the Whitney Building, at 133 Geary street, San Francisco, is a novel installation, in that, while originally designed to supply light, power and heat to this building, its scope was subsequently extended to give service to neighboring buildings. The plant has a present capacity of 725 k. w. and is being augmented by an additional 300 k. w. unit. It supplies electric current and steam heat to the Schroth Building, the Mercedes Building, the Sachs Building, the Mauzy Building, the Whittell Building, the Moore Furniture Company, the Newman & Levinson Building, and will be extended in the near future to the Kohler & Chase Building. For this purpose two lines of 12-in. pipe have been run to Stockton street, one to Union Square avenue, up which it is continued to Stockton street, whence it runs to Post street, and another down Union Square avenue to Kearny street. Another line is to be extended from the building to O'Farrell street. These pipes are wood encased, 12 in. in diameter, and installed by the American District Steam Company. Through them exhaust steam is conveyed for heating purposes.

The three generators are Westinghouse direct current 3-wire type, complete with equalizer coils, 250-125 volts. The 125 k. w. generator is direct connected to a duplex Ball engine rated at 170 h. p. and the two 300 k. w. generators are direct connected to 500 h. p. Ball engines of the compound angle type. These engines are designed to run non-condensing, the exhaust steam, as already stated, being used for heating Steam is furnished by four boilers, two Sterling and two Franklin, having a combined heating surface of 9670 sq. ft. Two of these boilers are operated at all times; the others being held as a reserve for peak or emergency service. The auxiliary apparatus includes a double set of Deane marine type feed pumps, each one large enough to handle the entire needs of the plant, two Blake oil pumps and one Berryman closed feed water heater. Fuel oil is stored in two tanks having a capacity of 7000 gallons.

The switchboard was especially designed for this plant, the specifications being drawn up by the power company's engineers. The neutrals, instead of being brought to the switchboard, are run direct to the feeder lines, thus eliminating neutral switches and bus bars at the boards. The switchboard apparatus is of the standard Westinghouse type and includes ten d. c. ammeters, scale reading 0—2000 amperes; one d. c. ammeter, scale reading 0—1500 amperes; one d. c. voltmeter, scale of 0—300 volts; one d. c. voltmeter, scale reading 300—0—300 volts and two d. c. integrating wattmeters. There are five panels of gray marble, three controlling the engine and two the feeders. Allowance has been made for installing an additional engine panel and three additional feeder panels. This plant was furnished through Hunt, Mirk & Co. and installed under the personal supervision of the chief engineer, Robert McGlynn. It may be of interest to state that the governor regulation is unusually good. With 300 h. p. in elevator motors direct connected there is no visible flickering of the lights operated from the same set.

DIFFERENCE BETWEEN LOAD FACTOR AND POWER FACTOR.

The "load factor" of any power station, or system, for any given period of time, is the ratio of the average load during such period, to the maximum or peak load for the same period.

The daily load factor should be distinguished from the monthly or yearly load factor. The latter might or might not be equal to a daily load factor for any date, depending on the date taken. For instance, a daily load factor taken in December would exceed the yearly load factor (from January to December), whereas the daily load factor in July would be less than the yearly load factor.

The term load factor applies to all loads, whether direct current or alternating current.

The term "power factor" is used in alternating current work, and means the ratio of the actual current flowing in any electrical circuit or apparatus, to the virtual or apparent current flowing therein. The apparent or virtual current is composed of two parts, (1) an energy part, and (2) a part without energy, called the "wattless" component. The wattless component does no useful work and cannot be measured by a watt meter (hence the name wattless) and merely dissipates useful energy in heating the wires composing the circuit through which it passes. The desirability of a high-power factor (which is equivalent to having the wattless component as small as possible) is on account of the following:

The capacity of any piece of electrical apparatus is limited (among other things) by the safe rise in temperature to which it may be subjected. The greater the current passing through it the greater will be the temperature rise (in fact, the heat loss, on which the temperature rise is dependent increases with the square of the current). This wattless current, as stated above, does no useful work but, on the other hand, (1) does reduce the capacity of the apparatus for producing or carrying "energy" or useful current, and (2) in addition, the wattless current is an actual source of loss on account of the heating caused thereby.

As above stated, the term power factor inherently applies to alternating current work. In direct current application, the "apparent" current is actually and always the same as the actual current and, therefore, in direct current work the power factor (so-called) must always be unity, or 100 per cent.

An examination for Junior Engineer Draftsman is announced by the United States Civil Service Commission on January 5, 1910, to fill vacancies as they may occur in the position of junior engineer draftsman, Engineer Department at Large, at salaries ranging from $1,000 to $1,500 per annum, according to qualifications. Applicants must indicate in their applications that they have had at least a high-school education; that they have had at least five years' experience as draftsman, two of which should have been on design; that they are familiar with calculations, structural details, and shop practice in structural steel and reinforced concrete; and that they are capable of preparing working drawings from the calculations and from written specifications and rough notes.

THE TUNGSTEN LAMP AND ITS RELATIONS TO THE CENTRAL STATION.[1]

BY GEORGE MERRILL.

The object of the following article is to show the effect of the tungsten lamp and its later developments, upon commercial interests. We wish to show that the relation between the central station and the lamp manufacturer is a very close one, and almost one of mutual dependents. The lamp manufacturers are as vitally interested in the commercial success of the tungsten lamp upon central station circuits as are the central stations themselves. The tremendous success with which this lamp has so far met is most gratifying and the rapidity with which central stations have adopted it has even exceeded expectations.

At the Atlantic City meeting of the National Electric Light Association last June, two papers, one dealing with the effect of the tungsten lamp on revenues, and the other a report submitted by the Lamp Committee recommended to central stations a broad tungsten policy, as productive of the best results. Companies were urged to overcome their fear of decreased revenue in connection with the new lamps, as in practically every case it was found that the revenue could be maintained by the new business available as a result of placing the tungsten lamp freely before the consumer.

Moreover, a consideration of the ultimate benefits which are sure to follow such a plan should be enough to overcome any fears for the present. The two papers referred to, the one based largely upon replies to forty questions submitted to a large number of companies throughout the United States and Canada, and the other based on the judgment of several prominent men of the Association, who have taken a broad view of the present situation, spoke with such favor of the new lamp that we cannot but believe that the central station must find it valuable. This conclusion is further warranted by the experiences of a number of companies from various parts of the country as brought out in the several discussions at the same meeting.

In central station work the fixed operating and investment expenses form such a large proportion of the total cost of operation that it is very essential to take such charges correctly into consideration in laying out a profitable and equitable system of rates. In some cases the fixed charges which were to cover the fixed expenses were calculated on the basis of a certain number of hours use of the connected load, usually in the familiar "16 c. p. 50 watt equivalent," and were then included in some way in a kilowatt hour rate and thus made dependent on the amount of energy consumed.

It thus happened that in some cases central stations were operating on a system of rates which did not appear well adapted to a change to a higher efficiency lamp. The reduction in the amount of energy required to produce a certain quantity of light, by the perfection of new light sources, naturally disturbed those central stations whose rate systems were largely based on the use of carbon lamps and were it not for the fact that the new lamps served to stimulate a desire for more light on the part of the consumers, and further that it has been possible to secure business with the tungsten lamp which would not have been available with a less efficient and less attractive source of light, the situation would have been far from pleasant for many central stations. The reception of the tungsten lamp by those stations whose rates were largely on k. w. h. basis was rather unenthusiastic until the possibility of developing new business by its use became known. The same general state of affairs existed in the gas industry at the time of the introduction of the Welsbach mantle. The gas companies at first looked with considerable disfavor upon the newcomer through fear that the straight meter rate so largely used in the sale of gas would result in a serious loss of revenue. Experience soon demonstrated, without a question of a doubt, that the advent of the high efficiency Welsbach lamp was a wonderful stimulant to the gas business and that the creation of a new business department and the active work along the lines of heating and cooking devices which came with increased activity in the lighting end of the business, served to bring about a very prosperous condition. We may confidently expect a similar prosperity in the central station industry, as a result of the increased interest and activity awakened by the tungsten lamp. Public interest is now aroused in the question of lights and lighting as never before. A consumer who can, when daylight fails, flood his residence or store with a clear white light, that even rivals in beauty the daylight which it has been called upon to replace, derives a certain sense of satisfaction from his electrical service that he had never before felt. He appreciates the fact that light is a very valuable thing, and that good light, and plenty of it, will accomplish wonders in making his home more inviting or his store more attractive.

The high efficiency of the tungsten lamp makes it possible to secure in all classes of service whether residential or commercial, a degree of illumination, which, a few years ago, would have been almost beyond question because of the excessive cost, and which could not have been rivaled in purity of color at any price.

The residential lighting field can be profitably invaded with tungstens, if the campaign is properly carried out. As a general rule people are usually willing to spend about so much for electrical service and through a reduction in the cost of electric lighting by the use of more efficient lamps, electrical heating and cooking devices of all kinds are offered an excellent opening. The effect of such a residential campaign should eventually tend to cut from the peak of the station load curve and fill in the hollow which has so long troubled the central station men.

A residential consumer, who installs tungsten lamps, thus reducing his maximum demand, and who by the use of any of the very handy electrical devices, and who consumes practically the same number of k. w. h. as before with a lighting load only, betters his individual load factor, and enables the central station to serve with a given k. w. of installed capacity a larger connected load. Such results cannot be secured in a day, but must come with a gradual education of the consumer to the advantages of electrical service for other purposes than for lighting alone, and with such

[1] Abstract of Paper read before Indiana Association of Central Station Men.

realization on the part of the consumer, will come increased prosperity for the central station.

The effect of installing the tungsten lamps on commercial circuits has been proven to be very successful and has raised but little doubt as to effect on revenue. Commercial customers are usually willing to take considerably more light, than they had previously been using as they realize that the advertising value of such illumination makes it well worth the cost. I am sure that many merchants obtain more benefit from the attractive appearance of their store and show windows than from almost any other form of advertising, and further that a proper lighting installation can do more toward producing such a desired effect than any other one thing.

To see that the new lamps are installed in the best possible manner should be the aim of every possible central station. It is not only unjust to the consumer but it is poor policy on the part of the station to allow tungsten installations to be made without at least telling the consumer something as to the best manner of using the lamps. It may not be possible to put in new fixtures, but in any case, the use of proper reflectors as well as the proper location of units should be strongly urged. Reflectors do not wear out and the only expense after the first installation is in replacing accidental breakage and this should be almost negligible. So much can be added to the general appearance of the store and the illumination can be so greatly improved by the use of proper reflectors and by properly locating the light sources that a station can hardly afford to neglect this important matter. It is not at all uncommon to see tungsten lamps which have replaced carbons, used in the same fixture often with very absurd glassware. Sometimes a little fluted porcelain bell which has no value from an artistic or practical point of view is seen placed so high on the lamp that it does not even serve to hide the filament from view.

Then again we may see a show window lighted with a number of bare tungsten lamps close studded tip downward on the ceiling. The tip candlepower which is practically all that is being utilized is rather low in the case of the tungsten lamps and the goods in the window are in consequence very poorly illuminated. The judicious use of a few reflectors in this case, would transform the dark and unattractive window into such a blaze of light that the merchant would feel that he was certainly getting his money's worth. It is needless to say that the good will of its customers is a valuable asset to any central station, and for a central station to have its customers feel as though they were being given full value for the cost of their service speaks well for the future prosperity of that station.

Merchants have quickly come to realize the value of good light as an advertising medium. The question of reduced consumption and therefore of possible reduction of income as far as such service is concerned, is not of so great importance. It is in the residential service where the smaller units are more in demand, that the central station has been somewhat worried as to the effect on revenue, but a progressive new business policy will work wonders in the field, and will eventually make customers heretofore deemed undesirable very valuable and profitable to the station.

The carbon filament lamps of 3.1, 3.5 and 4 watts per candle have been improved gradually from their early forms by constant research and development work, and even within the last few years, a great deal has been done in bringing all types and sizes to a uniform high quality by more rigid inspections, careful photometry, and close selection. The Gem lamp, the first step toward high efficiency, with a cellulose filament, metallized by the heat of the electric furnace, made it possible to burn them at an efficiency of 2.5 w. p. c. with a life comparable to that of the carbon lamp at 3.1. A little later the tantalum lamp, with a metallic filament, was produced and was able to give a good commercial life at 2.00 w. p. c. This lamp did not receive the attention from the general public that it might have because the anouncement of a lamp of even still higher efficiency was made before the tantalum lamp had been really commercially introduced.

The tungsten lamp is the result of years of research in the realm of new materials suitable for incandescent filaments. Great difficulties have been overcome, but the work will not stop and the next years will witness a gradual improvement in the quality of the tungsten lamps, which today are giving such good results, just as the carbon filament lamps became better and better as experience was gained in the details of their production.

The tungsten lamp has been commercially developed for practically all classes of service, ordinary multiple, street series, sign lighting, train lighting, automobile lighting, miniatures for flash lights, surgical use, and for general decoratve effects. A 150 watt 120 c. p. tungsten lamp has recently been added to the standard multiple line and fills the rather wide gap which previously existed between the 100 and 250 watt sizes. This lamp is placed on the market with the belief that it will, in many cases, prove very valuable in changing from gas to electric installations. The tungsten lamp for 220 volt service can soon be obtained, in wattages of 45, 70, 110 and 180. These lamps should prove most valuable where 200 to 250 volt service is installed, as it will be the first high efficiency lamp produced for high voltage work.

While the tungsten lamp represents today a wonderful state of perfection when the short time in which it has been on the market is taken into consideration, we confidently hope to improve the present high quality as the manufacturing processes become more and more minutely investigated and perfected in the smallest details. It is obvious that such results can be secured only by patient and careful work and that the improvements will be none the less assured because they are necessarily slow. Furthermore, any new types or sizes which can possibly serve to widen the useful field of the tungsten lamps, and of electrical illumination in general, will be developed and placed on the market as the demand arises.

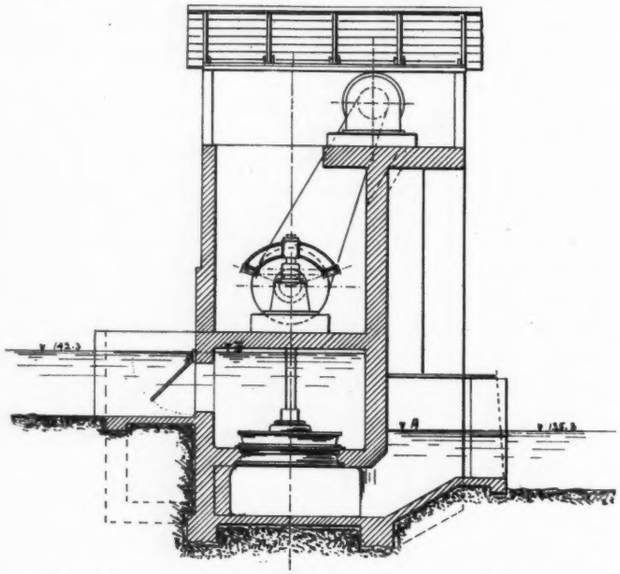
The central station man may feel absolutely confident that in offering the tungsten lamp freely and without hesitation to his consumers that he is placing at their service the best means of converting electrical energy into useful light, and that a broad policy together with an interest in seeing that the lamps are installed in the best manner, cannot but in the end prove to be of the greatest benefit not only to the consumers but to himself as well.

A NOVEL PUMPING INSTALLATION.

An installation of considerable interest to coast engineers has recently been started by the Sacramento Valley Irrigation Company, of Willows, at the head works of their main canal in Glenn County, Cal. As this canal was originally built, the intake is somewhat higher than the low water level of the river, so that it is necessary to resort to pumping for the supply of water for irrigation purposes during the dry portion of the season.

As the water falls in the river the pump has to be designed to operate against a head varying from zero to a maximum of about 6 ft. in a normal season, and in an exceptionally low season the water in the river goes to such a low level that it is necessary to pump against a head as much as 8 ft.

After a thorough investigation of the merits of the various pumps on the market, it was decided to install a turbine pump constructed on the Jonval principle, or practically an inverted Jonval turbine. These pumps are being designed by O. C. Goeriz in units of 200 cu. ft. per second with a maximum efficiency at 7 ft. lift.



The station, when completed, will be one of the largest pumping stations in the world for irrigation purposes, and will pump a stream of water 6 ft. deep and 85 ft. wide.

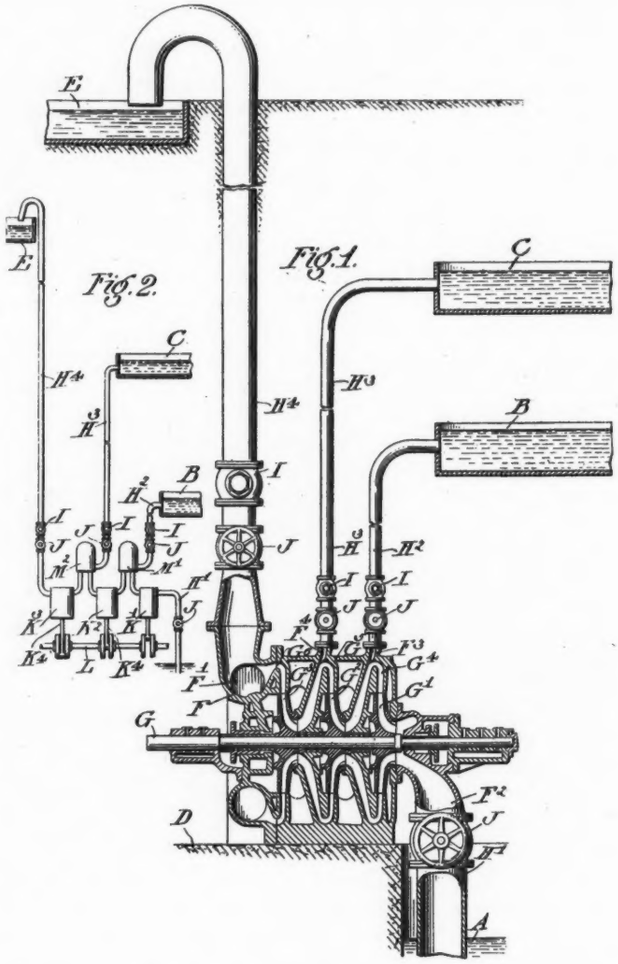
We present herewith a cut showing the general arrangement of the pump, motor drive, and building. As the water rises under flood conditions about 24 ft. above normal low water, it was necessary to make the floor of the motor room 26 ft. above normal low water.

The belt system of driving was adopted, so that the speeds of the pump for operating against the various heads, should be readily changed and still have the low first cost of a standard speed motor.

The efficiencies attained by this type of pump are considerably higher than any centrifugal pump of the ordinary design, and this is especially marked when operating against extremely low heads, as occurs under the conditions outlined above. The Nevada Machinery & Supply Company are the contractors for the entire installation, and are now actively engaged in the construction.

A NEW HIGH PRESSURE CENTRIFUGAL PUMP.

There has recently been patented by O. C. Goeriz, of San Francisco, an adaptation of the centrifugal pump that is well fitted for pumping water from the different levels of a mine or in fire fighting apparatus, where both high and low pressure water mains are available. The apparatus is claimed to be at once simple, compact and efficient. Of the drawings, Fig. 1 is an elevation, partly in section, showing a centrifugal pump employed for pumping water from different levels of a mine, and Fig. 2 is a diagramatic



elevation of mine pumping apparatus, in which the pump employed is a multi-stage piston and cylinder pump.

In the drawings, and referring first to Fig. 1, A, B, and C represent the bodies of water forming the sources of supply of the water pumped, these bodies collecting in the various run ways or levels of the mine. D represents the pumping level which is located below the upper levels B and C and above the level A. E represents the discharge level or upper surface of the body of water into which the water pumped from the level A, B, and C is discharged. In the pumping level is located a centrifugal pump F, which may be operated by an electric or other motor. The rotating portion of the pump comprises a shaft G having secured to it three impellers or rotating sets

of blades G′, G², and G³. The impellers G′, G², and G³ discharge into the stationary outlet passages G⁴, G⁵, and G⁶ formed in the casing or stationary part of the pump F. The pump is provided with a low pressure inlet connection F² leading to the impeller G′, and with intermediate inlet passages F³ and F⁴ which communicate with the passages G⁴ and G⁵ respectively, and therefore lead in effect to the inlet sides of impellers G² and G³. The passage G⁶ leads to the outlet passage F′ of the pump. To the inlet passages F², F³, and F⁴ are connected conduits H′, H², and H³, respectively, leading from the water levels A, B, and C, respectively. A conduit H⁴ leads from the outlet passage of the pump to the discharge level E. Preferably, in each of the conduits H² and H³ is located a non-return or check valve I arranged to prevent an upward flow of water through the conduits H² and H³. Preferably, also, each of the pipes H² and H³ has in it a throttle valve J. The conduit H⁴ is also provided ordinarily with a non-return valve I to prevent downward flow of water from the conduit, and with a manually controlled throttle valve J. A throttle valve may also be located with advantage under some circumstances in the supply conduit H′.

In operation, the water passing to the inlet sides of the impellers G′, G², and G³ is discharged into the passages G⁴, G⁵ and G⁶ respectively under a pressure which exceeds that at which it is received by an amount corresponding to the potential energy put into the water by the impellers. The pump impellers should, of course, be of a proper size and form and should be run at the proper speed for efficient operation under the conditions of use. Satisfactory operation of pumping apparatus of the type disclosed in Fig. 1 can be had, however, under widely varying conditions on account of the inherent self regulating qualities of the apparatus. The pressure of the water entering the pump from conduit H² through the inlet F³, for instance, must be equal to the pressure of the water at the adjacent portion of the pump passage G′. The pressure of the water entering the pump through port F³ is that due to what may be called the effective head of the water in the conduit H². This effective head is equal to the static head less the loss in head due to the friction. This loss of head due to friction is not constant, but depends upon the rate of flow through the conduit H², increasing to a maximum when the outlet F³ is unrestricted, and decreasing to zero when the outlet F³ is closed. In a centrifugal pump the pressure of the water delivered by an impeller running at a constant speed is not constant, but decreases as the volume of water delivered by the impeller increases, though not in direct ratio. As a result of this characteristic regulation, water will pass, for instance, to the impeller G² from the inlet port F³ and from the impeller G′ so long, on the one hand, as the maximum pressure imparted to the water by the impeller G′ does not exactly equal or exceed the static head due to the difference between levels B and D, and, on the other hand, so long as the pressure of the water delivered by the impeller G′ does not fall below the pressure corresponding to the static head less the maximum friction loss of head in the conduit H². The ratio of the volume of water passing to impeller G² from the impeller G′ can be varied by varying the discharge of the impeller G′ or by varying the effective head of water passing into the pump through port F³. The latter method of variation can be readily had through the operation of the throttle valve J in the conduit H², as the effect of opening and closing this valve is within quite wide limits exactly the same as decreasing or increasing respectively the frictional resistance of the conduit to the flow of water through it. It will thus be seen that by adjusting the various throttle valves J the relative amounts of water pumped from the different sources can be varied without otherwise altering the operation of the pumping apparatus. Under special conditions, as where it is desirable to draw relatively large amounts of water continuously from the levels B and C, it may be desirable to make the impellers G′, G² and G³ of progressively increasing capacities. Where, however, as is frequently the case, the supply from the upper levels is intermittent the impellers may well be made all of the same size, as when so made the pump will operate with reasonable efficiency even though a large proportion of the water pumped is drawn through the ports F³ and F⁴. At times some or all but one of the valves J in pipes H′, H² or H³ may be closed, altogether.

The apparatus shown in Fig. 1 is capable of operation in ways differing from that described above. For instance, in a fire protection, at one of the levels, say C, a reservoir may be located to be filled from level A, the valves J in conduits H⁴ and H² being then closed. In case of fire, by closing conduit H′ and opening conduit H⁴ the water could be pumped from level C to level E or delivered from the pump with a pressure corresponding to the head of level E with much less horsepower of course than would be required to then pump the same water directly from level A.

In Fig. 2, the multi-stage pump comprises three pumping chambers K′, K² and K³, each having a piston, the connecting rods K⁴ of which are coupled to and driven by the common shaft L. In this form, the outlets of the low pressure and intermediate chambers K′ and K² are connected to air regulating pressure chambers or reservoirs M′, M², and the inlet sides of the chambers K² and K³ are connected to the reservoirs M′ and M² respectively. In this form where the pumping pistons all make the same number of strokes of equal length it is essential that the chambers K′, K² and K³, should be of progressively increasing capacities, that is, the pistons should be of progressively increasing diameters, since a pump of this kind does not have the capacity for automatic regulation of output characterizing a centrifugal pump. Instead of varying the diameters of the pistons, the length of stroke or speed of stroke of the different pistons may be adjusted to give the desired result. In consequence of this difference in the regulating characteristics of the two pumps, the centrifugal pump should be used in preference to the other where the conditions make it desirable to vary from time to time the relative volumes of fluid pumped which are drawn from the sources of different pressures.

APPROVED ELECTRICAL DEVICES

CONDUIT BOXES, FLOOR OUTLET.

"Columbus" Floor Outlet Box. Iron Box, adjustable ring, brass cover and fittings, with porcelain receptacle mounted on stirrup. Approved Oct. 15, 1909. Manufactured by

Electric Supply Co., Gay and Third Sts., Columbus, Ohio.

CONDUIT BOXES.

"Union" pressed steel outlet boxes for use with rigid conduit; galvanized or enameled finish. Cat. Nos. 101-112 incl., 108-L, 120, 130, 140 and 150. Approved Oct. 19, 1909. Manufactured by

Chicago Fuse Wire & Mfg. Co., 170 S. Clinton St., Chicago, Ill.

"S. E. Co." For Rigid Conduit: Cast Iron, Cat. Nos. 2520, 2521, 2525, 2526, 3001, 3002, 3003, 3004, 3005, 3006. For Flexible Steel Conduit or Steel Armored Conductors: Cat. Nos. 1904, 1905, Styles 5040-5044, 5140-5144, 5050-5054, 5150-5154, 5211, 5212, 5220, 5221, 5250-5254, 5260-5264 (lined or unlined), Cat. Nos. 6236-6239, and Cat. No. 6240 fiber flange. Stamped Steel, Cat. Nos. 6200, 6200 Straight Electric, 6219, 6220, 6221, 6222, 6225, 6225 Deep, 6231, 6231 Deep, 6249, 6250, 6300, 6350, 6350 Deep, 6350 N, 6399, 6399 Deep, 6400. Junction Boxes, Cast Iron, Cat. Nos. 2504-2514 (lined or unlined.) Covers of Stamped Steel, Cast Iron or Porcelain suited for above boxes. Approved Oct. 16, 1909. Manufactured by

Sprague Electric Co., 527 W. 34th St., New York, N. Y.

CONDUIT OUTLET PLATES.

"Fancleve" cast iron outlet plates. Cat. Nos. 601-605 incl., for knob and tube work. Cat. Nos. 700, 701, 802 and 803 for armored cable. Cat. Nos. 171-175 and 161-165 incl., for use with canopies of fixtures where supply wires are in wooden moulding. Cat. Nos. 561-565 incl., for use with rigid conduit. Approved Oct. 27, 1909. Manufactured by

Fancleve Specialty Co., Jamaica Plain Station, Boston, Mass.

FIXTURES.

"Linolite" Portable Fixtures with straight filament lamp. Devices supplied with length of portable cord and attachment plug. Cat. Nos. 1659-1669 incl. and Cat. No. 1676. Approved Oct. 27, 1909. Manufactured by

Johns-Manville Co., 100 William St., New York, N. Y.

LAMP CLUSTERS.

"Dale" Wireless Clusters. Multiple or series types, 130 and 197. Multiple only 227 and detachable 210. Also above types with fixture stems, reflectors and shades. Approved Oct. 18, 1909. Manufactured by

Dale Company, 9th Ave., 13th and Hudson Sts., New York.,N. Y.

MISCELLANEOUS.

"Duntley" Pneumatic Cleaners, Nos. 1, 2 and 3, 110 V., A. C. or D. C. These devices are motor driven vacuum cleaners, the motor and pump being mounted inside of a cylindrical case of galvanized steel. These motors take 150-250 watts according to the size of machine. For use on ordinary lighting circuits. Approved Oct. 27, 1909. Manufactured by

Duntley Mfg. Co., 303-305 Dearborn St., Chicago, Ill.

"Santo" Vacuum Cleaner, 110 V. with A. C. or D. C. Motors. This device is a portable motor-driven vacuum cleaner, the motor and pump being mounted inside a cylindrical sheet steel case. Full load input to motor not over 250 watts. For use on ordinary lighting circuits. Approved Oct. 4, 1909. Manufactured by

Keller Manufacturing Co., 21st St. and Alleghany Ave., Philadelphia, Pa.

Electrically Iluminated Computing Scale. A computing scale provided with four candelabra sockets and lamps wired in series for use in illuminating the display sign and computing barrel of the scale. A switch mounted inside the case and operated by the scale beam closes the circuit when pressure is applied to the scale pan. A receptacle is provided for attaching the sockets to 110 volt supply. Approved Oct. 28, 1909 Manufactured by

Toledo Computing Scale Co., Toledo, Ohio.

RECEPTACLES, STANDARD.

"Bryant" key and pull (50 C. P. 250 V.), and keyless (3 A. 250 V.) Brass Shell Wall Sockets. Key, Cat. Nos. 9184, 60018, "New Wrinkle" 66609, 68136, 68139, with slotted or closed bases, and Angle Base 50753. "New Wrinkle" 68224. Keyless, Cat. Nos. 9185, 50717, 60019, 60020, "New Wrinkle" 66610, 68137, 68140, with slotted or closed bases, and Angle Base 50755, "New Wrinkle" 68225. Pull "New Wrinkle," Cat. Nos. 66611, 68128, 68138, and Angle Base 68236. Wall sockets mounted on K. W. link fuse rosette base, 2 A., 125 V. Cleat types, key, keyless and pull, Cat. Nos. 50730 and 50733. Concealed types, key, keyless and pull, Cat. Nos. 50729, 50732. Also all the above types with shadeholders attached. Approved Nov. 2, 1909. Manufactured by

Bryant Electric Co., Bridgeport, Conn.

"Perkins" key (50 C. P. 250 V.), and keyless (3 A. 250 V.) Wall Sockets, Brass Shell. Key, Cat. Nos. 9184-P, "New Wrinkle" 66609-P, 68136-P, 68139-P, and angle base (slotted or closed) 68224-P. Keyless, Cat. Nos. 9185-P, "New Wrinkle" 66610-P., 68137-P., 68140-P., and angle base (slotted or closed), 68225 P. Mounted on Thomas link fuse rosette bases, 2 A., 125 V. Cleat, Cat. Nos. 24991, 24994. Concealed, Cat. Nos. 24990, 24993. Rosette Receptacles "Thomas" 2 A., 125 V. Cleat Cat. Nos. 25091, 25092. Concealed, Cat. Nos. 25093, 25094. Approved Nov. 2, 1909. Manufactured by

Perkins Electric Switch Mfg. Co., Bridgeport, Conn.

Key and keyless 50 C. P., 250 V. and 3 A., 250 V. respectively. Brass shell key wall socket, concealed, Cat. No. 142. Sign Receptacles, Cat. Nos. 212, 260, 265, 267, 268, 272, and "Russell" 276. Conduit Box, Cat. No. 210 and "Russell" 280. Approved October 11, 1909. Manufactured by

Freeman Electric Co., E. H., Trenton, N. J.

RHEOSTATS.

Armature Speed Controllers, Types KRE, KVE, HRE, HVE, TR, VR and R, 100-600 volts. Generator Field Rheostats, Types FF, FB, FFE and FBE, 50-600 volts. Motor Field Rheostats, Types FM, FME, SM, SME, EM, EME, 125 and 250 volts. Theater Dimmers, Types BD, SD and IBD, 125 and 250 volts. Battery charging Rheostats, Types MC, KC, LI, RI, and DC. Approved Oct. 11, 1909. Manufactured by

Ward-Leonard Electric Co., Bronxville, N. Y.

RHEOSTATS.

Motor Starting Rheostats, Bulletins 10, 10½, 13, 16, 17 and 20. Universal Panel Type, Bulletin 21. Compound Starting and Regulating Rheostat, Bulletins 24 and 25. Approved Oct. 11, 1909. Manufactured by

Cutler-Hammer Mfg. Co., 12th St. and St. Paul Ave., Milwaukee, Wis.

ROSETTES, FUSELESS.

"Circle T," 3 A., 250 V. Cleat, Cat. Nos. 750, 752 and 992. Concealed, Cat. Nos. 753 and 993. Moulding, Cat. Nos. 754 and 994. Approved Oct. 9, 1909. Manufactured by

Trumbull Electric Mfg. Co., Plainville, Conn.

ROSETTES, FUSELESS.

Bryant, 3 A., 250 V. Cleat, Cat. Nos. KP 1499, "Junior" 1999, 297 also 869 with porcelain sub-base 1247. Concealed, Cat. Nos. KP 1710, "Junior" 298. Moulding, KP 1497, "Junior" 299. Conduit Box, "Junior" 369, also 370. Approved Oct. 27, 1909. Manufactured by

Bryant Electric Co., Bridgeport, Conn.

Two-piece fuseless rosettes 3 A., 250 V. Cleat types Cat. Nos. 310 and 330. Moulding types Cat. Nos. 331. Concealed types Cat. Nos. 332 (deep) and 333. Approved Oct. 27, 1909. Manufactured by

Freeman Electric Co., Trenton, N. J.

ROSETTES, LINK FUSE.

"Circle T," 2 A., 125 V. Cleat, Cat. Nos. 762 and 950. Concealed, Cat. No. 891. Approved Oct. 8, 1909. Manufactured by

Trumbull Electric Mfg. Co., Plainville, Conn.

SOCKETS, STANDARD.

"G. E." Brass Shell Sockets. Key, Cat. Nos. 1317, 1318, 9386, 44389, 50760, 99386, "Security Snap" 44147, 44148, 44151, 44814, "Multi-Catch" 59952, 59953, 59956, 59958, also lock type 58951. Keyless, Cat. Nos. 1319, 1320, 9392, 44390, 50768, 66237, 99392, "Security Snap" 44149, 44150, 44152, 44815, "Multi-Catch" 59596, 59954, 59955, 59957, 59959, also lock type 58957. Pull, Cat. Nos. 68009-68011 incl. Also all the above types with shadeholders attached. Approved Oct. 12, 1909. Manufactured by

General Electric Co., Schenectady, N. Y.

SWITCHES, AUTOMATIC.

5 A., 250 V. This device is a single pole, double break, mercury contact switch, which is operated by means of air pressure. It is designed for use as a regulating switch for small motors used with dentists' or physicians' air compressors, etc. The switch is contained in a cast iron case about 5 inches in diameter by 2 inches deep. A diaphragm valve operates against counter-weighted lever, causing a circuit-closing yoke piece to enter or withdraw from two mercury cups. Approved Oct. 19, 1909. Manufactured by

Gearless Automatic Pump Company, Rock Island, Ill.

SWITCHES, AUTOMATIC.

"Williams" time switch, Types A, B, C and D, 20-35 A., 250 V. This device consists of a clock and spring actuated motor, operating an approved double-pole surface snap switch. All parts are mounted in a castiron case. Approved Oct. 7, 1909. Manufactured by

Williams Time Switch Co., 47 John St., New York, N. Y.

SWITCH BOXES.

"Union" single and sectional gang types for use with rigid conduit or flexible tubing. Cat. Nos. 155, 160 and 170 Types AA, AA with removable side, BB and CCS. Approved Oct. 19, 1909. Manufactured by

Chicago Fusc Wire & Mfg. Co., 170 S. Clinton St., Chicago, Ill.

Cast iron boxes for use with flexible steel conduit or armored cable. Cat. Nos. 3001-3006 (lined or unlined) 5281, 5950, 5951, 5971-5978 incl. and 5991-5998 incl. Approved Oct. 27, 1909. Manufactured by

Sprague Electric Co., 527 W. 34th St., New York, N. Y.

Sectional pressed steel switch boxes, 1 to 6 gang, for flexible tubing and for rigid conduit. Approved Oct. 18, 1909 Manufactured by

Appleton Electric Company, 212 N. Jefferson St., Chicago, Ill.

SWITCHES, COMBINATION CUT-OUT.

Cat. No. 7251, 30 A., 250 V. Spring actuated double pole, double break plunger type switch with cartridge enclosed fuses, device enclosed in suitable cast iron case with rabbeted door and provided with hinge bolt and wing nut for locking same. Also Cat. No. 9251, 30 A., 250 V., with extended case enclosing terminal blocks for branch circuits. Approved Sept. 4, 1909. Manufactured by

Detroit Fuse & Mfg. Co., 40-46 Champlain St., Detroit, Micn.

SWITCHES, KNIFE.

"Barkelew" motor starting switches for use with A. C. motors, 2 or 3-phase up to 5 h. p., not over 250 V.; also 3-phase, 30 A., 250 V. D. C., 500 V. A. C. A spring controlled double throw knife switch equipped with cutouts for N. E. Code cartridge enclosed fuses. Fuses are in circuit only when switch is in running position. Approved Nov. 3, 1909. Manufactured by

Barkelew Electric Mfg. Co., Middletown, Ohio.

SWITCHES, PENDANT SNAP.

"Perkins" 2 button type, single pole, 10 A., 125 V., 5 A., 250 V. Approved Oct. 15, 1909. Manufactured by

Perkins Electric Switch Mfg. Co., Bridgeport, Conn.

SWITCHES, ROTARY FLUSH.

"G. E." Switches: Single Pole, Indicating, 5 A., 250 V., 10 A., 125 V. Cat. 60468; Single Pole, Non-Indicating, 5 A., 250 V., 10 A., 125 V. Cat. 60469. Double Pole, Indicating, 10 A., 250 V., 10 A., 125 V. Cat. 60470; Non-Indicating, 10 A., 250 V., 10 A., 125 V. Cat. 60473. Three-Way, Non-Indicating, 5 A., 250 V., 10 A., 125 V. Cat. 60475. Four Way, Non-Indicating, 2 A., 250 V., 5 A., 125 V. Cat. 60476. Two Circuit, Indicating, 2 A., 250 V., 5 A., 125 V. Cat. 60478; Non-Indicating, 2 A., 250 V., 5 A., 125 V. Cat. 60477. Three Circuit, Indicating, 2 A., 250 V., 5 A., 125 Cat. 60479; Non-Indicating, 2 A., 250 V., 5 A., 125 V. Cat. 60480. The above types with composition button or key attachment, Cat. No. 60598, and key. Approved Oct. 15, 1909. Manufactured by

General Electric Co., Schenectady, N. Y.

SWITCHES, SURFACE SNAP.

"G. E." with or without indicator, closed or slotted bases. Single Pole, 3 A., 250 V., 5 A., 125 V. Cat. Nos. 59873-74, 60294-95, 66036, 66037. Cleat types, porcelain covers, Cat. Nos. 03313, 61909. Miniature concealed types, Cat. Nos. 62553-62556 incl.; 5 A. 250 V., 10 A. 125 V. Cat. Nos. 60447-50. Double Pole, 5 A. 250 V. Cat. Nos. 60950-53, 66039, 66040; 10 A. 250 V. Cat. Nos. 60451-54. Three Way, 1 A. 250 V., 3 A. 125 V. Cat. Nos. 59875, 60296, 66038; 3 A. 250 V., 5 A. 125 V. Cat. Nos. 60955, 60041; 5 A. 250 V., 10 A. 125 V. Cat. Nos. 60455-56. Four Way, 2 A. 250 V., 5 A. 125 V. Cat. Nos. 60458-59. Two-Circuit, 2 A. 250 V., 5 A. 125 V. Cat. Nos. 60460-63. Three-Circuit, 2 A. 250 V., 5 A. 125 V. Cat Nos 60464-67. The above types with composition button or key atachment, Cat. No. 60598, and key. Approved Oct. 15, 1909. Manufactured by

General Electric Co., Schenectady, N. Y.

"Jones" Ceiling Attachment for Diamond H switch, 10 A., 250 V. Approved Oct. 15, 1909. Manufactured by

J. J. Waldman, 136 Liberty St., New York, N. Y.

TRANSFORMERS.

Bell ringing transformer designed for connection to 110 V. A. C. circuits; secondary giving 4, 8 and 12 volts. Approved Nov. 3, 1909, only for ringing bells and for similar signaling work and when primary wiring is installed in accordance with Class C of the National Electrical Code. Manufactured by

Fort Wayne Electric Works, Fort Wayne, Ind.

WIRES, WEATHERPROOF.

Tag on coil to read, "Nat'l Elec. Code Standard." Approved Nov. 3, 1909. Manufactured by

Wire & Cable Co., 241 Guy St., Montreal, Canada.

LEASING OF PUBLIC OIL LANDS.

In connection with the recent action of the Administration in withdrawing from entry over 3,000,000 acres of public petroleum lands in California, Wyoming, Utah and Oregon, the following statement is given out by Dr. C. W. Hayes, Chief Geologist of the United States Geological Survey:

"To remedy the present unsatisfactory conditions by which public oil lands have to be entered under a law framed primarily to provide for placer gold mining entries, it is generally admitted by those interested in the economical development of oil lands that a radical revision of the American mining law is necessary. Anticipating that Congress will recognize and meet this evident need, the Secretary of the Interior has withdrawn from all forms of entry all vacant public lands designated by the Geological Survey as probably containing oil and gas. This executive action is, however, only temporary, and is intended to preserve the status quo until Congress acts.

"When the present placer mining law was enacted probably no one in Congress or out had any idea that it would ever be made to cover mineral deposits so far removed in every essential characteristic from gold-bearing gravels as are oil and gas. Yet when oil was found on the public lands no other law was on the statute books except the placer law under which title to it could be acquired, and this anomalous and wholly unsatisfactory condition still holds—to the great detriment both of the Government and of the oil industry.

"The fundamental basis of a location under the placer law is discovery, and the courts have held uniformly that there can be no legal location until there has been a discovery. But in the nature of the case there can be no discovery of oil until a well has been drilled at great expense, since ordinarily there are no surface indications of the oil and the well must be drilled upon purely geological inference. It follows, therefore, that the driller will be wholly unprotected against rival claimants to the land until he has completed his first well or he will be forced to make a false claim to discovery on which to base his location.

"One very common method of evading the law is to locate oil under the guise of a gypsum claim. In many of the California oil land fields the surface soil contains a small amount of gypsum, although rarely in sufficient quantity or purity to be profitably mined, even if favorably located for transportation and market. It affords a pretext, however, for a location under the placer law, and large numbers of claims have been patented where it is a matter of common knowledge that the real object is to acquire title to the oil. In this way land worth thousands of dollars an acre has been acquired from the Government for two dollars and a half an acre, and this without oil development. Moreover, it is not generally the man of small means but rather the wealthy corporation that resorts to this subterfuge to secure title.

"Although many of the oil fields in the public land States, and particularly those in California, are in regions wholly devoid of agricultural possibilites, no sooner is a successful well drilled than the entire district is covered by homestead and scrip entries—the purpose of which is to secure title to the oil under cover of the agricultural land laws. It is to meet these conditions that a thorough revision of the law is needed.

"Any law which will adequately meet the requirements of the case must recognize the fundamental difference between oil and gas and other minerals, namely, mobility. These elusive products can be drawn from a distance underground across boundary lines, and exclusive title to the product is acquired only after it reaches the surface. It follows, therefore, that oil can be disposed of by the Government or other owner of the land in which it occurs only as a commodity and not in terms of acres like coal or other minerals occupying fixed locations. This difference is so well recognized that it has determined the leasing system which is practically universal in all the oil fields where the land is in private ownership. The Government cannot do better than to adopt the plan which has been worked out through long experience, and, where the holdings are sufficiently large, found thoroughly satisfactory, both to the oil operator and to the private land owner. Why should not the Government as a land owner deal directly with the producer rather than through the intervention of a middleman to whom title to the land has passed?

"And ideal or practical law must further recognize the fact that actual discovery involves heavy expenditure and considerable time, and that the prospector must be adequately protected in his investment before as well as after the discovery is made. The area to which he is given a preferred right must therefore be sufficiently large to justify his initial heavy investment and in such compact shape as to protect his discovery from encroachment by drilling on subsequent entries.

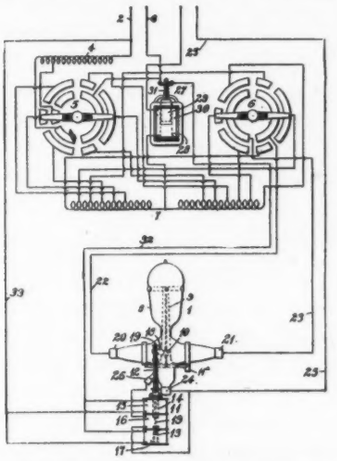
"A well considered leasing law will give certain incidental advantages of great importance both to the Government and to the oil operator. It will constitute the most effective means for the conservation of the oil and gas resources of the country by enabling the Government to regulate developments so as to prevent much of the criminal waste now prevalent.

"Under the present system the owner of a twenty-acre placer claim is compelled to drill and pump the oil from his land with all possible speed, regardless of transportation facilities or market, for otherwise his competitors on adjoining claims will take a large share of it away from him. In the resulting feverish exploitation half a dozen or more wells may be drilled when one would have secured the same amount of oil—a serious economic waste to the nation and a heavy tax on the ultimate consumer. Also, unrestricted drilling by careless or ignorant operators may ruin a valuable field by admitting water to the oil sand from a higher or lower water-bearing stratum. Many examples of criminal waste resulting from the unrestricted exploitation of oil fields might be cited.

"The Government is not only the largest owner of oil lands, but it is likely to be the largest consumer. The six largest battleships in commission or under construction in the American Navy are equipped for the use of either oil or coal, and the fourteen largest destroyers use oil exclusively. The question of fuel supply for these vessels is certain to become an exceedingly important one in the near future, and the law should provide a means of perpetuating a supply for this certain future need.

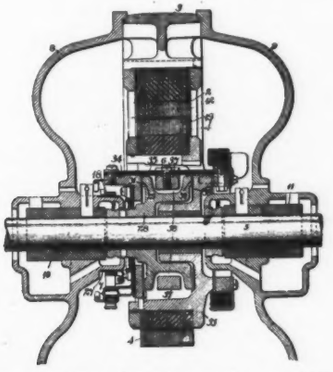
PATENTS

940,736. Vapor Electrical Apparatus. Harold H. Scheibe, Wilkinsburg, Pa., assignor to Westinghouse Electric & Manufacturing Company. In vapor electric apparatus, the combination with a pivotally mounted supporting frame, and a rectifier bulb having alternating current terminals, a direct current terminal and an auxiliary terminal, of a starting or tilting



magnet for the frame comprising stationary and movable core members, actuating coils therefor and an opposing coil in inductive relation thereto, the respective terminals of the opposing coil being connected to the direct current terminal and to the auxiliary terminal of the rectifier.

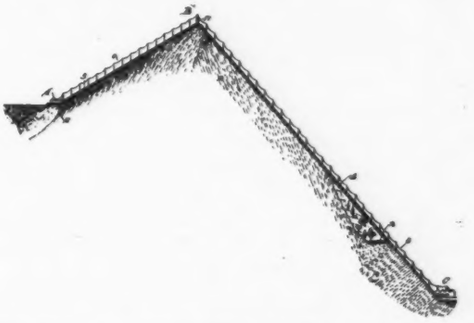
940,698. Dynamo-Electric Machine. Benjamin G. Lamme and Russell S. Feicht, Pittsburg, and George H. Garcelon, Wilkinsburg, Pa., assignors to Westinghouse Electric & Manufacturing Company. In a dynamo-electric machine, the combination with a primary core member, windings therefor having different time constants, a relatively rotatable secondary



core member, a winding therefor and a resistance in circuit therewith, of an automatically operated means serving to cut one of the primary windings out of circuit and also to remove the resistance from the secondary circuit.

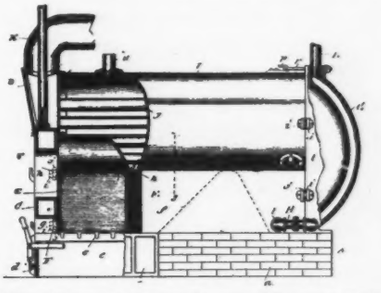
940,654. Art of Nullifying Inductive Disturbances. William E. Athearn, New York, N. Y., assignor to American Telephone and Telegraph Company. The method of arranging circuits for the transmission of signals over a group of lines employed in a system for the purpose of inducing electromotive forces in other lines of said system to neutralize inductive effects produced in all the lines by some source external thereto, which consists in establishing conducting paths in the neutralizing group of lines, said paths being independent of other similar paths in the same group and serving to conduct neutralizing currents resulting from the induced electromotive forces, generating in the neutralizing group of lines counter electromotive forces approaching in magnitude the induced electromotive forces, passing distinct signaling currents through the independent paths, and separating the induced from the signaling currents over portions of the paths.

941,090. Apparatus for Applying Water-Power. Frederick T. Newbery, San Francisco, Cal. An apparatus for obtaining a water power and water supply from elevated lakes or bodies of water, on the opposite side of the water shed from that on which the proposed power station is situated, said apparatus having in combination a primary pump at the source of supply adapted to force a small volume of water up over the summit



and down to the power station on the opposite side therefrom, means for generating an electric current by power derived from said flow of water, means for conducting the electric current thus generated back to the source of water supply, a pumping mechanism at the source of supply of greater capacity than the first-named pump actuated by said electric current and adapted to force an increased volume of water over the summit to the power station on the opposite side therefrom, and a generator of increased energy at the power station actuated by said increased volume of water.

940,684. Boiler. Daniel Hanlon, Spokane, Wash. A boiler comprising a suitable base, a water-containing shell disposed above the base and having an under side concave in cross-section and also having longitudinal hollow depending portions at opposite sides of said concave underside, longitudinal flues extending through said shell, a front hollow water-containing section superposed on the base and arranged in front of the shell, a rear hollow water-containing section, superposed on



the base and having a concave inner side opposed to the rear end of the shell, side hollow water-containing sections superposed on the base and interposed between and connected with the front and rear sections and having crosswise concavities in their upper sides receiving and holding the depending side portions of the shell, and an uptake arranged above the front water-containing section and adapted to receive products of combustion from the forward ends of the flues in the shell.

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POWER AND GAS

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Changes of advertising copy should reach this office *ten days in advance of date of issue.* New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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Los Angeles is to have a public utilities commission which is to supervise the work of its public service corporations. The ordinance creating this commission was passed by the City Council over the veto of the Mayor who favored an ordinance providing for three commissioners to serve without salary and having at their disposal an annual appropriation of $12,000. The ordinance as passed provides for five commissioners at a salary of $1000 and a secretary at a salary of $2,400, leaving but $600 of an $8,000 appropriation to carry on the work of the commission after the salaries have been paid. If the current expenses of similar commissions be accepted as a criterion, Los Angeles will find that an appropriation of ten dollars per month per commissioner will so hamper their activity as to make the position a sinecure. There can be no question but what some supervisory regulation of public corporations is inevitable, but it does not seem that Los Angeles has adopted the best scheme.

Holiday Wiring Dangers

Although the electric light has lessened the fire and life hazard of the home Christmas tree, it has increased the danger in shop show-windows. A word of warning to merchants is therefore seasonable. This matter forms the subject of an opportune letter that the Chicago Board of Underwriters is sending to merchants who use attractive lighting and motor effects in their holiday displays. Particular emphasis is laid upon the danger of placing cotton, tinsel or other inflammable material in proximity to electric lamps. Attention is also called to the necessity for proper wiring. Such electric displays should be installed by competent electricians who understand that the requirements for this service in no way differ from those of a permanent installation. It should further be approved by the electrical inspectors. These precautions are but trifling when their value as an insurance for both fire and life risks is considered. The danger of these fires lies not so much in the damage to the stock as it does in the possibility of an ensuing panic among shoppers.

Fire Boats

Following the lead of New York, Chicago and Duluth, San Francisco is now putting into service twin fire boats as a protection for the shipping and commercial interests along the water front. These are a valuable auxiliary to a vast scheme of high pressure fire protection and stationary pumping equipment now under way, for the vessels are equipped with valves to which hose may be attached and water furnished to fires at some distance from the boats. These fire boats present the same formidable appearance as do the small craft of the Navy, being armed, however, with 3-inch water monitors, which are much better fire fighters than gatling guns. Every part of their equipment has been designed for business and there is little likelihood that

they may be used for junketing trips. The key-note of the construction has been compactness, as may be inferred by the large amount of apparatus which has been crowded into a vessel less than 130 feet in length.

This apparatus is such as has been dictated by the most advanced practice in hydraulics. Steam turbines and centrifugal pumps give maximum efficiency with minimum space requirements. The multi-stage centrifugal pump, under the special conditions of high stream pressure demanded by this service, shows greater economy than the double cylinder, inverted, reciprocating type which it has displaced. Its combination with the steam turbine is a happy one, as thereby much of the vibration is eliminated and the steam consumption reduced.

It will be noted that separate prime movers have been installed for propulsion and for pumping, reciprocating engines being used for the former and steam turbines for the latter. The high speed of the turbine, while admirably adapted to the centrifugal pump, is not fitted for the screw propeller, which is more efficient at lower speeds. In the Chicago boats this difficulty was met by mounting a generator and a pump on the same turbine shaft. While going to the fire the generator furnishes current to the electric motors which drive the propellers, and while fighting the fire the turbine drives the pump. Recently Rear-Admiral George W. Melville and Mr. J. H. McAlpine have invented a helical reducing gear between turbine and screw that gives greater propelling efficiency. By using either of these methods the great weight of the reciprocating engine is removed and the power plant made even more compact.

During the trial test these boats steamed at full speed down the bay, while throwing powerful streams of water from the monitors. While this is a requirement never reached in practice, it is, perhaps almost as inspiring a spectacle as that of a gun-boat in action.

Airing Boilers

Every fireman knows how to fire boilers, but few understand the fine art of "airing" them. Air is just as important a raw material for producing heat as is fuel, for without air that chemical combination, known as combustion, does not take place. Solid fuels, such as wood, lignite, coke and coal, consist largely of carbon, as does also fuel oil. When carbon is completely burned it unites with the oxygen of the air to form carbon dioxide and in so doing liberates heat. From the fact that it requires thirty-two pounds of oxygen to consume twelve pounds of carbon, and that air contains but two-ninths of oxygen by weight, it may be readily reckoned that twelve pounds of air are required to burn one pound of carbon. By volume this means that it theoretically takes about one hundred and fifty cubic feet of air for every pound of carbon burned. While this is correct in theory, we find in practice that the most satisfactory results with natural draft is obtained by using from eighteen to twenty-four pounds of air per pound of carbon, forced draft requiring about sixteen pounds. Hence we realize the importance of air for boilers.

For every boiler and for every fuel there is a definite amount of air that gives the best results. Any variation from this specific quantity means waste. By furnishing less air the combustion is not complete, some of the carbon being converted into carbon monoxide, which action liberates less than one-third as much heat as is set free by burning the carbon to carbon dioxide. Insufficient air also means that there is not enough draft to carry away the products of combustion and the fire may be smothered. On the other hand, too much air means heat lost in the flue gases. There is, then, a golden mean between either extreme of air supply that means dollars saved. This mean may be determined from an analysis of the flue gases, but it is produced and maintained only by the greatest watchfulness on the part of the fireman.

These flue gases are made up chiefly of nitrogen, together with smaller amounts of carbon dioxide, carbon monoxide and oxygen. The nitrogen remains inert in its passage from the fire-box to the smoke-stack.

Consequently, to learn the boiler efficiency, it is merely necessary to determine the amount of carbon dioxide present, as this amount bears a certain relation to the losses either from air excess or deficiency. It has been found in experiments conducted by the United States Geological Survey that these losses are at a minimum when there is nine per cent of carbon dioxide present. It seems likely that these experiments were conducted under special conditions and that for other boilers under other conditions there is some other proportion that determines the maximum boiler efficiency, the average being about twelve per cent. This, however, can be determined accurately only by experiment and requires the services of a skilled engineer. Once it has been determined, however, it is only necessary for the fireman to keep it constant. This he can do by watching the condition of his fire bed, and regulate it by adjusting the damper so as to give the proper proportion of air, both above and below the fire grate.

The air supply must be first adjusted so as to completely burn the fuel. Different fuels require different treatment to be consumed at the best efficiency. A lignite containing volatile matter requires more air above the grate than does an anthracite; oil or finely powdered coal is sprayed with steam or air so as to burn like a gas. Care must always be exercised in firing to see that the air has a free passage through the fuel.

The amount of air admitted, besides influencing the fuel combustion, also governs the operation of that tremendous conveying machine, the stack. Every ton of coal burned means about twenty tons of gas to be carried away. The chimney is the ancient and original heat engine. With natural draft the motive power for this elevator is furnished by the hot flue gases and is measured by the difference between their weight and that of an equal volume of cold air on the outside. Its power varies with the temperature of the gases and the height of the stack. Insufficient draft means low temperature because of incomplete combustion. Excess draft means cooler gases and also greater weight to be lifted. In ancient Cornwall the sign of the skillful coal miner was the gad. In modern America the sign of the skillful coal firer should be the damper.

PERSONALS.

R. D. Holabird left San Francisco last week for a trip throughout the East.

S. K. Colby of Pierson, Roeding & Co., returned to San Francisco this week from an extended trip East.

H. Bishop has been appointed manager of the San Benito Light and Power Company, of Hollister, Cal., taking the place of J. L. Galbraith.

S. B. Russell of the electrical department of the San Francisco office of the H. W. Johns-Manville Co., is visiting the interior towns of California.

Max Cuzin, formerly chief electrician at the Mare Island Navy Yard, but recently with the Van Emon Elevator Co., is now superintendent of construction for the Nevada Machinery & Supply Co., of San Francisco.

F. J. Low has succeeded C. N. Manfred as manager of advertising for the H. W. Johns-Manville Company, of New York. Mr. Low has been associated with this compauy several years and brings to his new position a thorough knowledge of factory and construction work and of the technicalities of the publicity requirements.

Charles Robbins who has for many years been connected with the Westinghouse Electric & Manuacturing Co., in the industrial and power sales department in connection with the sale of industrial motors, has recently been appointed manager of this department. Mr. Robbins has been with the company since 1899 in which time he has been in the manufacturing department, the New York district office sales department and for the past three years in the industrial and power sales department at East Pittsburg. His headquarters will continue to be at East Pittsburg.

Samuel A. Chase, who for the past few years has been with the Westinghouse Electric & Manufacturing Co., in their New York sales office as a special detail and supply salesman, has recently resigned to accept a position with the White Investing Company, of New York City, a financial investment company handling stock of many different organizations. Previous to Mr. Chase's employment with the Westinghouse Electric & Manufacturing Co., he was a salesman for the Western Electric Co. Mr. Chase will, after January 1st, be in charge of the Chicago office of the White Investing Company, having exclusive territorial rights in North and South Dakota, Minnesota, Iowa, Illinois and northern Indiana.

G. Brewer Griffin has recently been appointed manager and actively is directing the sales policy of the detail and supply sales department of the Westinghouse Electric & Manufacturing Co., in which department transformers, meters, fans, heating appliances, switches, switchboards, railway line material, etc., are sold. Mr. Griffin has been assistant manager of this sales department for six years past, having previously been connected with the sale of detail apparatus in the Boston office, altogether having been employed some seven years with this company. Previous to his connection with the Westinghouse Company, Mr. Griffin was with the Manhattan General Construction Company of New York as a special representative, finally opening an office for them in Boston.

S. L. Nicholson has recently been appointed general sales manager of the Westinghouse Electric & Manufacturing Co., and has direct charge over the sales policies of the entire company. Mr. Nicholson has been with the company for eleven years in many different capacities, as salesman, as district department manager, and as industrial and power sales manager for the past five years, from which last position he resigned to take the present post. Before coming to the Westinghouse Company he was with the C. & C. Electric Company. He is perhaps best known to motor manufacturers as the organizer and president of the American Association of Motor Manufacturers, an organization which has done much in the two short years of its life to improve the art of manufacturing motors.

LOS ANGELES REJUVENATION.

On Saturday night, November 20th, the Los Angeles Sons of Jove held a Rejuvenation and Joviation in honor of the appointment of H. Conger Bowers, as Statesman for Southern California. The banquet was held at the Hoffman Cafe and to impress the candidates with the fact that the Sons of Jove was an unusual organization, the entire menu was served backwards, beginning with finger bowls, cigars and black coffee and ended up with soup. The menu was spelled backwards also, consequently it was hard to tell whether a dinner had been served or they had swallowed a joke. The Rejuvenation was held on the third floor of the Pacific States Electric Company's Store at which 13 candidates were initiated and from the abuse heaped on them proved to their entire satisfaction the ill omen attached to that numeral. The following officers served up the trouble: Jupiter, C. G. Pyle; Mercury, H. C. Bowers; Pluto, Arthur Ballard. Neptune, Chas. Hartung; Vulcan, C. E. Warner; Hercules, Chas. Coulter; Mars, R. H. Manahan; Apollo, Solemn Baker; Avrenim, Newt. Graham; Imps, Walter Fagan and Chas. Carter.

Walter Fagan as an imp can rightfully be called King of Imps and what he can't think of Arthur Ballard can, therefore what chance the candidates had can best be answered by them. After the Rejuvenation, Mr. Benedict entertained via the piano route, assisted by the pretzel quartette. Restoratives for the candidates and refreshments for the members were then served.

It might be well to mention the Sons of Jove Lunch Club meet every Thursday at the Hollenbeck Hotel at 12:15 and all electrical men are cordially invited to attend.

MECHANICAL ENGINEERS' MEETING.

The thirtieth annual meeting of the Society will be held in the Engineering Societies Building, 29 West Thirty-ninth street, New York, December 7 to 10. The entire social entertainment will be in charge of the members resident in and about New York, under the immediate direction of a local committee appointed by them, of which Mr. William D. Hoxie is chairman. For Wednesday afternoon, December 8, an excursion is planned which members and guests will be asked to attend in a body, and during the balance of the time there will be opportunities for smaller parties to visit places of interest. In the evening there will be a lecture for members and guests upon the subject of Agricultural Machinery.

The professional papers assigned to the meeting are as follows: Tests on a Venturi Meter for Boiler Feed; Chas. M. Allen; The Pitot Tube as a Steam Meter, Geo. F. Gebhardt; Efficiency Tests of Steam Nozzles, F. H. Sibley and T. S. Kamble; An Electric Gas Meter, C. C. Thomas; Tan Bark as a Boiler Fuel, David M. Myers; Cooling Towers for Steam and Gas Power Plants, J. R. Bibbins; Some Studies in Rolling Mill Engines, W. P. Caine; An Experience With Leaky Vertical Fire Tube Boilers and the Best Form of Longitudinal Joint for Boilers, F. W. Dean; Testing Suction Gas Producers With a Koerting Ejector, C. M. Garland and A. P. Kratz; Bituminous Gas Producer, J. R. Bibbins; The Bucyrus Locomotive Pile Driver, Walter Ferris; Line Shaft Efficiency, Mechanical and Economic, Henry Hess; Pump Valves and Valve Area and a Report on Cast-Iron Test Bars, A. F. Nagle. In addition to the above papers there will be several valuable reports submitted by committees of the Gas Power Section.

DISCUSSION

ELECTRICAL RESUSCITATION.

To the Editor:—The article printed in the Journal of November 13, 1909, regarding the resuscitation of persons receiving shocks from electric conductors, was a step in the right direction. It is unfortunate that the electric companies do not insist upon their employes getting such knowledge before employing them, and also insisting upon their employes being more careful when handling wires that are either dead or alive.

I can cite you instances where handling a "dead" wire proved it to be very much alive, and also proved very unpleasant to the man who had the supposed dead wire in his hands. I have seen linemen (and that only a few days ago) while erecting poles in this place, lean over two power wires belonging to the electric railway company and holding on to the top of an iron pole with one hand and guiding a wet pole through a maze of wires overhead. Should the insulation of the power wires be poor, and a low resistance between the iron pole top and body of pole, a badly singed lineman, if not worse, would result. I have often heard linemen boast of handling live wires with 2000 or more volts on them, and have often done the same thing myself, and up to the present time have not met with serious accident, although I have some marks as mementos of making the connection between a 2,000 volt power line and the ground through a high resistance. Had the resistance been lower and had I not had my strap around the pole, a bad fall would have been the result.

I have this to say, that too much stress cannot be laid on the fact that the men who handle wires or other electrical apparatus do not exercise the proper amount of care in their daily routine, and an occasional death from shock does not seem to drive the fact home to the majority that there is grave danger in the supposed dead wires. I can testify from my experience ranging over a period of some eighteen years, as dynamo tender, stringing wires outside, and inside, and setting up of electrical apparatus, that ninety-five out of every hundred accidents of this kind is directly or indirectly due to the carelessness of the person injured or to some one connected to or with the work.

I do not care what accident happens, it never happened by accident, but is always traceable to some carelessness or fault of some one on more persons who are in some way connected to or with the cause. P. J. B.

TRANSFORMER REGULATION.

To the Editor: In your issue of November 27th, giving the discussion on the paper by W. A. Hillebrand and S. B. Charters, Jr., I am reported as having said that a 60-cycle meter will register slow on 25 cycles. In the extemporaneous remarks referred to, the question of the meter was not in mind, but only the transformer operating the same.

A commercial meter shunt transformer designed to operate one 60-cycle wattmeter if placed on normal voltage, 25 cycles to operate one 25-cycle wattmeter, will become very warm, due to excessive current required for exciting (in some cases this exciting current may be sufficient to overheat and burn it out). Such being the case, the copper drop is more than normal, so the secondary voltage is less than normal.

A 60-cycle wattmeter of the induction type placed on normal voltage and current, 25 cycles, will run much faster. This is due largely to the heavy shunt current which the 25 cycles permits to pass through the meter shunt circuit. A 60-cycle wattmeter of the Thompson type placed on normal voltage and current, 25 cycles, will run slightly faster, but can be adjusted to record accurately on 25 cycles.

Very truly yours, W. F. LAMME.

INDIVIDUAL UNITS VERSUS CENTRAL POWER PLANTS.

I think most engineers have noticed a decided difference in the attitude of the owners of large buildings in San Francisco toward the individual stationary engineering plants since the earthquake of 1906. Previous to that catastrophe the disposition was to do away with these individual plants, probably for two reasons: First, economy. Second, to obviate the dirt and smoke involved, and to economize the space occupied by coal, boilers and engines.

The rapid development of large power transmission stations supplied the means. The dividend earning capacity of these power stations depends upon keeping them loaded up at all times, and as the night load decreased the day power load must be used to take its place. These waterpower companies could therefore easily afford to sell the power to consumers of day loads at a very low figure, which was less than the same power could possibly be supplied by individual units.

The local power plants were thus not only shut down but in some cases dismantled and taken out to make room for merchandise or for other commercial purposes, the motors used to supply their place occupying a relatively small space.

The result as demonstrated by the earthquake, with its destruction of the Spring Valley water mains, was that buildings that had wells to supply water but electric motor pumps to handle the water were helpless. The resumption of business in some districts not covered by fire was also unnecessarily slow because of the destruction of distributing stations and connecting mains.

As a consequence many of the large buildings of the city now have not only wells to supply water in emergency, but power plants as well. These plants may or may not be run continuously, but are kept in running condition. Oil having largely replaced coal for fuel, decreases the space necessary and insures cleanliness and greater economy, producing little or no smoke when burned properly.

On account of the tendency to consolidation of large power units into still larger combinations which must finally become one large corporation, then without competition, comes the era of monopoly and the ability to dictate prices. The lack of individual power plants leaves the consumer at the mercy of such conditions. The only alternative, then, to avoid excessive charges, is the delayed installation of the power unit. This will generally be found to be more expensive than if it were installed when the building is first built and is less satisfactory. On the part of those who have provided in advance, however, the means are always at hand to command fair prices, such prices, at the same time, as would be profitable prices to the power company. The provision of wells and steam power gives added protection from fire and should decrease insurance rates where installed.

Humanity generally are not inclined to sympathize with the individual or set of individuals, when in trouble, who have not protected themselves by a proper foresight, so it seems only ordinary business ability to look into the future with an eye open to such protection. It might be stated that the basis for the value of such a plant to the consumer, is such that the sum of the interest on the investment necessary, together with that of the cost of maintenance, should not be greater than the difference created by the bid of the power company less than its schedule rates.

Outside of the advantages I have stated this might be said to be true, also that the ability of the consumer to furnish his own power for less than the published schedule causes a cut of rates, the lack of such ability may cause an addition of rates on various pretexts. With the elimination of competition by future consolidation and the possession of the sources of water power, which is the aim of the present holders, what would prevent the raising of rates to suit new conditions?

The interest of the engineer lies with the consumer and should urge him to greater effort to increase the efficiency and economy of the individual unit.

G. W. CUTHBERTSON.

INDUSTRIAL

WESTINGHOUSE TYPE C THREE-PHASE TRANSFORMERS.

The three-phase transformer presents certain inherent advantages of compactness in construction and installation, since it supplants with a single piece of apparatus the equivalent group of three single-phase transformers otherwise required for the same service. The simplicity of connections and the better appearance presented by the three-phase transformer when installed on a pole or elsewhere, have led many customers to prefer it to the equivalent arrangement of three single-phase transformers.

Recent marked improvements have been made in Westinghouse type C three-phase transformers, resulting, besides the advantages already enumerated as inherent to this design, in decided advances in both construction and performance. In these transformers the losses are reduced below those of any ordinary equivalent combination for transforming three-phase power, while experience in design and modern factory methods have produced a highly serviceable apparatus that

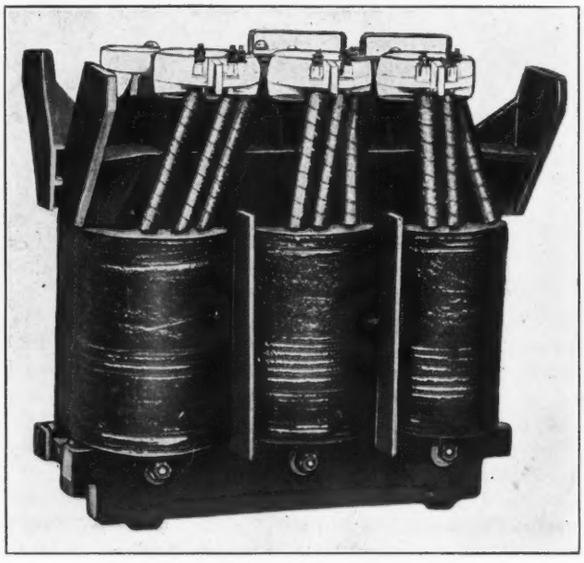
External View, Type C Three-Phase Transformer

can be sold below the price of the equivalent single-phase transformer group.

These type C three-phase transformers are made in sizes ranging from 5 to 75 kilowatts capacity, and display very high efficiency at all loads, as well as close regulation when operating on currents having low power-factors. These properties of good regulation and efficiency, together with the compactness and simplicity of type C three-phase transformers, make them especially adaptable for supplying motor loads.

The accompanying illustrations show the appearance and construction of this apparatus. The cast-iron corrugated case employed is quite similar in design to that used in the well-known Westinghouse type S transformer. The three high-tension leads enter from the front side of the transformer, the low-tension secondaries issuing from the pole side of the case. Provision has also been made for bringing out neutral leads, when desired, from both the high and low-tension windings. Separate terminal blocks are provided for both the high and low-tension leads of each of the three phases. Each low-tension winding comprises two coils which can be connected in parallel for 110 volts, or in series for 220 volts, the standard designs being for 2200 volts on the high-tension side.

In general, the design and construction are developments of the well-known Westinghouse type S, single-phase, lighting transformer, and the transformers have the advantage of the same high grade of material and workmanship.



Coils and Core of Type C Three-Phase Transformer

MEETING OF THE TECHNICAL PUBLICITY ASSOCIATION.

The Technical Publicity Association held its second fall meeting on Thursday evening, November 11, at the National Arts Club, 14 Gramercy Park, New York. There was an unusually large attendance at the informal dinner, which was followed by an interesting program. The feature of the evening was a spirited debate on the merits of special issues of technical and trade papers. Arguments were supplied by several men of national reputation in the technical advertising field.

A novelty was the vote taken by the members of the association at the close of the debate. All were asked to confine their balloting strictly to the merits of the arguments as presented. When the vote was counted, it showed that 25 were opposed to special issues of trade journals and 10 in favor. One man voted "Yes, for real issues."

The argument was opened by Mr. James H. McGraw, president of the McGraw Publishing Company, who spoke for the affirmative. He declared that he believes in the special issue to a certain extent, but it must have three features to make it of extra value to the advertiser. In the first place, said Mr. McGraw, it must have a legitimate reason for its publication. The editorial matter must be distinctive, and the extra circulation promised must be honestly given. "When these three are present," said the speaker, "it is unquestionably a good advertising medium."

Mr. McGraw declared that he always put the subscriber first and that the advertiser should put him first. He gave a concrete example of a very well known special, or as he said, "souvenir" edition of a technical trade journal. The situation in this particular field has shown so many changes in the past half dozen years that there are comparatively few books on the subject. A book if presented with such an end in view, he said, would become obsolete by time a demand had been created for it, because of the many changes

in the field. The special issues of the trade journal printed each year on the occasion of an annual convention, according to Mr. McGraw, supplied the place of an engineering text book, dictionary and encyclopedia for that special field. A number of special issues of this sort if preserved, will have the merit of a series of volumes on special subjects.

That there was a demand on the part of his subscribers for a special issue was Mr. McGraw's strongest point. He declared that inquiries concerning the special issue to which he referred had been sent out to the subscribers and that over 90 out of every 100 replies received were favorable to the special or souvenir edition. The issue, he said, should be planned along some central idea. There should be some legitimate reason for its publication, in which case it is not looked upon merely as an excuse for soliciting advertising.

This sort of issue, stated Mr. McGraw is not as profitable as some may think because of the changed conditions of publication.

"But then," said he, "technical journalism is not play. If the paper is made up of paste-pot and scissors it is not worthy to be considered by the man who has money to spend on advertising. The technical and trade paper field has suffered because of its early history and the traditions surrounding it."

Mr. Robert Frothingham, advertising manager of "Everybody's" made the first speech of those opposed to special issues. Mr. Frothingham spoke vigorously and his enthusiasm was infectious.

"The average special issue," said Mr. Frothingham, "is a tactical blunder and has no place in twentieth century trade journalism. Some advertisers call it graft. It is a practical confession that the publisher is short-changing his readers in all his regular issues. If the matter is live and vital it ought to be in each issue."

Mr. Frothingham scouted the idea that issues of trade journalism are of any value when laid aside for reference by the subscriber.

"He may intend to revert to it again," said Mr. Frothingham, "but the truth is, he never comes back to it. The pace is to swift."

The speaker was of the opinion that the failure of the special issues of trade journals in the past to give returns to the advertisers had done considerable harm by driving out of the advertising field men who might have benefited by other methods of publicity. To him it seemed like killing the goose that lays the golden egg. The average special edition, he declared, is purely for the benefit of the publisher, "and the advertiser pays the freight."

Mr. J. George Frederick, managing editor of "Printer's Ink," spoke earnestly in favor of special issues, but with certain limitations. He cited an instance where the diversity of interests in a particular field required special issues so that the editors might concentrate in separate numbers matter which could not well be presented otherwise. The abuses of the special issue he declared to be the exaggerated value to advertisers as represented by certain publishers. He did not think special issues of very much greater value than the regular issues, but declared there was a medium between the two extremes. "A quiet editorial policy of concentration," said he, "makes a paper more valuable."

Mr. L. F. Hamilton of the National Tube Company gave the point of view of a member of the T. P. A. He declared that in his personal experience, special issues had been considered merely on their merits as regular editions at the time they were published.

Mr. Carpenter of Philadelphia, a new member, declared that his advice to a certain trade paper publisher when asked for his opinion of special isues, was:

"Yes, get out one interesting number. For Heaven's sake send us one which we will read."

The Technical Publicity Association elected a number of new members at the meeting. In the absence of President Redfield, Mr. O. C. Harn, advertising manager of the National Lead Company, was toastmaster. Mr. Howard M. Post, chairman of the Publicity Committee reported very satisfactory progress. He presented a portfolio of technical and trade paper comments showing graphically the increasing recognition of the T. P. A. as a factor in the technical advertising field. The association, at the close of a very profitable evening, adjourned to meet again Thursday, December 8th.

1200 VOLT OPERATION OF SHORE LINE.

The first electric railway in the far East to choose the 1,200 volt direct current system is the Shore Line Electric Railway, running from Ivoryton to New Haven through Saybrook and Guilford, approximately 52 miles in length. After a careful investigation of the relative merits of both the 600 volt d. c., the 1200 volt d. c. and the single phase a. c. systems, the 1200 volt system was adopted as presenting the advantages of demonstrated reliability, saving in construction cost and in operating expense.

The Shore Line Railway is being constructed and equipped in accordance with the most modern railway practice. A power station is located on the Connecticut River near Saybrook and will contain two 1500 k. w., 25 cycle, 11,000 volt, 3 phase Curtis steam turbo generators with provisions for two additional units. Power will be transmitted three-phase to two stations —one located in the car house at Saybrook and the other at Guilford—each of which will contain three 200 k. w. 600/1200 volt rotary converters. Two machines will be operated in series to supply current at 1200 volts. The third unit will be used as a spare, the switchboard being so arranged that any two of the three units may be operated together in any relation.

Twelve cars will be operated, each equipped with four G E-217 (50 h. p.) 600/1200 volt railway motors and Sprague-General Electric Type M control. This equipment is arranged to operate on both 600 and 1200 volts. The cars will be provided with straight air brakes with CP-29 (25 ft.) 1200 volt air compressors. The entire equipment of the road will be furnished by the General Electric Company.

It is expected that the road will be in operation the early part of next year. Although eleven roads have adopted the 1200 volt system, the novel methods of construction in this instance will cause the operation of this road to be watched with much interest by railroad operators. As a very high class service will be maintained and the reliability of service is considered of primary importance, the selection of the 1200 volt direct current system indicates the growing favor with which this system is being looked upon as best meeting the requirements of interurban service.

GAS-ELECTRIC MOTOR CARS FOR SOUTHERN RAILWAY.

The General Electric Company has sold to the Southern Railway Company two of its latest type of gas-electric motor cars. These cars will be equipped with standard commutating pole railway motors of 100 h. p. Two of these motors are located on the forward truck, giving a motor capacity of 200 h. p. to each car. The current is supplied from a 600-volt generator, which is direct coupled to an 8-cylinder gas engine in the forward compartment. A controller similar to that used on an ordinary trolley car is located convenient to the operator, and through this the current passes from the generator to the motors. Combined straight and automatic air brakes will be provided with the usual valves and accessories. The car bodies will be of steel, about 55 ft. long, with a seating capacity of 52 passengers. Both rear and center entrances are provided, thus furnishing a convenient means of dividing the two classes of passengers as required in the South. The car bodies will be illuminated by electric light throughout. The order for these cars was placed with the General Electric Company after a thorough test of this type of car between Manassas and Strasburg last summer.

A FIRE AND A QUICK INSTALLATION.

Not all telephone companies can yet enjoy that sense of security that comes with the housing of their equipment in a fire-proof telephone building. In spite of precautions taken, scores of exchanges are burned out every year and there is scarcely a manager in the country who has not worried more or less over this possible interruption to his service with its attendent loss of both revenue and prestige.

The greatest difficulty looming before the average manager in connection with a possible fire is that of securing a suitable switchboard with any reasonable degree of promptness. However, a record just made by the Kellogg Switchboard & Supply Company of Chicago in replacing a board destroyed by fire would seem to indicate there is no longer any cause for worry in this respect.

Immediately following the total destruction of their central office by fire the Lamar & Barton County Telephone Company of Lamar, Mo., placed an order with the Kellogg Switchboard & Supply Company for a new 300 line, 2 position magneto switchboard, a main frame and No. 10 protector equipment, and a Kellogg pulsating and alternating current, pole changer ringing equipment. This order was received at Chicago the afternoon of Thursday, November 11th. On Saturday afternoon, November 13th, the entire equipment was shipped by express in exactly forty-eight hours after receipt of the order. The express company made delivery of the equipment at Lamar, Mo., late Sunday evening.

The Kellogg Company was promptly advised of the arrival of the equipment, and two of their skilled installers, stationed at Kansas City for just such emergencies, left for Lamar at 2:00 a. m. Monday morning. Before midnight of the same day the equipment had been completely installed ready for operation by the telephone company.

The building, shipping and complete installation of this equipment in three working days becomes the more remarkable when it is learned that the board was not in stock, but was assembled and wired complete and built to the telephone company's specifications. The board is fitted with the Kellogg Company's special double supervisory non-interfering cord circuits throughout. All cord circuits are provided with two ring-off drops and two cord circuit condensers, while ten of them contain in addition 4-section repeating coils for the proper and efficient connection of grounded and metallic lines.

Each position of the board is provided with master keys for ringing four party selective telephones to ground. In this connection a special circuit was provided whereby this selective ringing feature does not require the grounding of the alternating current, and the latter is left free from ground for the proper ringing of metallic toll lines and "phantom circuits." Each position of the board is furthermore equipped with line and supervisory pilot lamps, insuring prompt attention to all incoming calls and "disconnects," and notwithstanding the remarkably short time in which the board was shipped and installed, it is exactly as it would have been with weeks of time to spare both on its construction and installation.

TRADE NOTES.

The Duncan Electric Manufacturing Company reports that the past two weeks are the banner ones of the entire year in the sale of their Model E direct current watthour meters. The sales include a number of their new astatic switchboard meters with removable armature, as well as many of their new portable test meters with fly-back pointers.

NOTICE OF ERRATA.

In the article on "The Slide Rule as a Wire Table," by L. St. D. Roylance, Nov. 27, 1909, the formula in Example 1, on page 499 should read Rt=383.6 (1+.0042x110)=560.82 ohms.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD ADOPTS THE TELEPHONE FOR TRAIN DISPATCHING.

The New York, New Haven & Hartford Railroad Company has placed orders for telephone and selector apparatus for equipping the Northampton division for telephone train dispatching. The equipment consists of Gill standard bridging selectors and Western Electric telephone apparatus. This will be the first circuit so equipped on the New Haven road and covers a total of 77 miles, with 29 stations.

From the success attending the installation of telephone train dispatching equipments on the other large roads which have adopted this system of handling train movement, the indications are that after the completion of the first circuit by the New York, New Haven & Hartford Railroad it will extend the system to other divisions of the road.

PUBLICATIONS RECEIVED

The Prevention of Industrial Accidents. By Frank E. Law and Wm. Newell. The Fidelity and Casualty Company, New York City. Price, 25 cents.

This two hundred page pamphlet contains much valuable information compiled from various sources regarding the prevention of accidents among machinery workers. After a few general instructions to employers and employees as to the care to be exercised, the text deals with the various safety devices available for steam boilers, engines, electrical apparatus, elevators and shops. The treatment in each case includes specifications for instructions and instructions for safe operation. While intended primarily to introduce the service furnished by the publisher, it includes in compact form much valuable information. The data on first aid to the injured is meager, the text consisting essentially of recommended specifications.

The first six months of the current fiscal year of the Westinghouse Machine Company, which ended last month, showed a business volume representing the second largest in the history of the company for a similar period. From present indications, it is confidently expected that the next six months will, however, show a much better result. This is due to the fact that business conditions generally are constantly improving, and also because the company has taken on several new lines of product within the last year, now fully developed, and the exploitation of which is greatly enhancing the volume of output. Indeed, 40 per cent of the business done by the company in recent months is represented by these new lines. In addition, the revival of the electric railway business from the financial depression is the source of many new orders which the company is now obtaining. One of the chief officials of the machine company, speaking of the prospects, said yesterday: "There is every indication that the volume of our business will reach its normal figures again by the beginning of the new year." In this connection, the most gratifying feature is that the improvements in the company's manufacturing facilities and some essential changes in the organization of the plant are greatly contributing towards a very successful and profitable business.

An interesting lecture was delivered in the Chamber of Commerce, Washington, D. C., on November 16th, by Mr. Bruce Ford of The Electric Storage Battery Company. The lecture was illustrated by lantern slides covering the care and operation of the "Exide" Battery in Electric Vehicles and was followed by a general discussion of the subject. The meeting was largely attended, the increasing interest in the use of the electric vehicle being very noticeable in this city, and the lecture was found most helpful to owners and operators of this type of automobile. This is one of a series of lectures on the same subject given in different cities throughout the United States.

NEWS NOTES

FINANCIAL.

PASADENA, CAL.—A municipal water bond election will be held here about January 15th.

SANTA ANA, CAL.—Newport Beach will vote December 21st on a bond issue for erecting municipal water and gas plants.

LEWISTON, IDA.—Z. A. Johnson, president of the Nez Perce and Vollmer railway, confirms the report of the placing of bonds in Chicago for the $125,000 for the completion and equipment of the road.

NEWPORT, ORE.—At the City Council meeting bids for the sale of water works bonds were opened, and the bid of Morris Bros., Portland, for the entire issue of $30,000 taken. They take the bonds at par value and pay a premium of $300.

INCORPORATIONS.

SAN FRANCISCO, CAL.—National Water Company, capital stock $20,000, by G. A. Pope, J. D. Grant and W. L. Culver.

SPOKANE, WASH.—The Spokane Gas and Fuel Company has filed articles of incorporation with the county auditor, with a capitalization of $2,300,000.

SPOKANE, WASH.—Spokane Falls Gaslight Company has been reincorporated for $2,300,000 by A. E. Gallagher et al. Takes over old Union Gas Company.

VISALIA, CAL.—Greenleaf Water Company, capital stock $8,000, by Z. A. W. Smith of Whittier, A. B. Holt and F. J. Edmunds of Lindsay; place of business, Lindsay.

LOS ANGELES, CAL.—Redlands-Yucaipa Land Company, incorporated at $1,000,000 to colonize Yucaipa Valley, build up a town, develop water systems and subdivide big ranches into small tracts, has affected a permanent organization by electing the following officers: President, B. B. Harlan of Redlands; Vice-President, M. H. Newmark, Los Angeles; Secretary and Treasury, J. H. Logie, Redlands.

TRANSMISSION.

WILLCOX, ARIZ.—A power plant will soon be installed at the Mascot Copper Company's mine near Dos Cobezas.

SALINAS, CAL.—The Supervisors have granted the franchise for a power line between Salinas and Monterey to the Monterey County Gas & Electric Company. The bid was $100.

NEW WESTMINSTER, B. C.—The Vancouver Power Company will make application for the diversion of 55 cubic feet per second of water from Suicide creek near Dewdney station for power purposes.

LOS ANGELES, CAL.—The Board of Public Works is inviting sealed bids for furnishing one d. c. 225 volt electric generator for use on the Los Angeles Aqueduct, bids to be filed before December 13, 1909.

TWO RIVERS, WASH.—The Burbank Power & Water Company will let the contract at once for the construction of its new low-level ditch terminating here. The sum of $40,900 was appropriated for this purpose.

ENTIAT, WASH.—A project is under way to put in a pumping plant at Columbia siding to be operated by power developed at this place. Frank McKean of Seattle and Holland capitalists have the project in hand.

BAKER CITY, ORE.—The Baker River Power & Light Company, a new corporation, has filed notice of water rights with the auditor and will build a new plant at Concrete or as near that town as possible. Towns along the Baker River will be supplied with water, power and light by this company.

NEW WESTMINSTER, B. C.—C. T. Dunbar of Vancouver has posted an application for 1,200 cubic feet of water from the Marquam River for power purposes. He intends organizing a company for the development of electrical energy.

GLENDALE, CAL.—Bids for electric supplies were opened by the City Council last week. Contracts were awarded to John Roebling Sons Co. for $3000 worth of wire; to B. F. Kierulf Co., meters $3500 and poles $2000 to $3000; General Electric Co., transformers $500; Western Electric Co., transformers $1000 and E. F. Tuttler, street lighting fixtures $500.

CHELAN, WASH.—The State Board of Land Commissioners will meet here on November 30 to appraise the damage the State will sustain by granting the Great Northern Railway Company's petition to overflow the land along the shore of Lake Chelan. It is the purpose of the railway company to build a dam across the Chelan gorge below town to develop electrical power.

VANCOUVER, B. C.—The provincial authorities have approved of the plans of the Vancouver Island Power Company, a subsidiary organization of the British Columbia Electric Railway Company, for the establishment of a power plant on the Jordan river, in the southwest section of Vancouver Island. The plans represent a stated expenditure of $1,500,000 and include the creation of storage reservoirs on the creeks tributary to the Jordan and the erection of a generating plant, etc.

LOS ANGELES, CAL.—Final surveys have been completed for the projected hydro-electric development of the Consolidated Reservoir & Power Company, on Whitewater River in the San Bernardino Mountains, and it is expected that contracts for construction work will be let in the spring. The intake will be at an elevation of 7,000 ft. and will draw water from three streams which make up the south fork of the Whitewater river. Beginning at the intake five miles of cement pipe line will be laid, then a mile and a half of pressure pipe to a point where the first power house will be located; continuing from this point two miles of pipe will be laid, and three-fourths of a mile of pressure pipe to the location of the second power house. Among the promoters of the project are H. Edward Moore, George I. Lamy, Los Angeles; W. B. Scarborough, Monrovia.

ILLUMINATION.

CHEHALIS, WASH.—W. W. Seymour of Tacoma has accepted the gas franchise granted him by the Council.

SAN DIEGO, CAL.—The City Council has accepted the bid of the San Diego Consolidated Gas & Electric Company for a five-year contract for lighting the streets.

HOLLYWOOD, CAL.—City Clerk will receive sealed bids December 8th for installation and maintenance of a public electric lighting system in this city for a period of years after the contract is signed.

TACOMA, WASH.—The Council has adopted the report of the fire and water committee recommending the purchase of $25,000 worth of new incandescent lamps, also the report recommending the installation of new street lights.

RIVERSIDE, CAL.—Beaumont Gas & Power Company has applied to the Supervisors for a franchise to construct, lay, maintain and operate gas pipes and mains for the purpose of carrying gas for light, etc., and also to construct poles for the purpose of carrying electricity. Bids will be received for said franchise up to December 22d.

LOS ANGELES, CAL.—A contract has been filed at the office of the county recorder for the construction of a gas plant at Inglewood, in which MacGillivray and Caldwell were named as contractors. All equipment necessary for manufacturing and storing of gas and erection of buildings for housing machinery will be furnished by the contractors.

TRANSPORTATION.

RED LODGE, MONT.—The proposition of an electric road between this place and Laurel is being agitated by the Commercial Club.

CALDWELL, IDAHO.—It is reported that the Boise Interurban Railway Company will build a line between this place and Nampa.

CORVALLIS, ORE.—It is announced that the Oregon Electric Railway will extend one of its lines now en route to Eugene to this place.

COEUR d'ALENE, IDAHO.—The Inland Electric Company proposes to double track its road between this place and Spokane and will also eliminate grades and straighten the line.

PASADENA, CAL.—The construction of an extension of the Pacific Electric Railway line on North Los Robles avenue, will be undertaken as soon as the four-tracking of the short line is finished.

CLE ELUM, WASH.—The Cle Elum Traction Company, capital $300,000, has been incorporated by Frank S. and M. E. Farquhar of Tacoma to build and operate an electric line between this place and Roslyn.

HAYWARDS, CAL.—Residents of Mount Eden, Upper Haywards, Castro Valley and Eastern San Leandro will petition the Oakland Traction Company to construct a new street car line that will embrace their different districts.

PENDLETON, ORE.—The Washington & Oregon Traction Company will build three miles of street railway in Pendleton within the next five months. Mr. Fitz Gerald states that his company will furnish electricity for power and lighting purposes only to this city.

PENDLETON, ORE.—It is announced that the Washington & Oregon Traction Company will build three miles of street railway here and in this vicinity within the next five months in order to comply with its franchise. The franchise stands in the name of Max E. Baumeister.

WALLA WALLA, WASH.—The Washington-Oregon Traction Company has announced that it will move to Pendleton and will start work there soon and spend $3,000,000 in building roads. The company failed to secure a franchise here and claims it will take this step for that reason.

OREGON CITY, ORE.—It is reported that F. M. Smith, who has for two years been promoting a project for the construction of an electric railway from this place to Silverton, through the Molalla Valley, has succeeded in interesting capital in the enterprise and that the construction of the line will follow.

SEATTLE, WASH.—The Independent Seattle-Tacoma Electric Railway Company has been organized, with F. K. Burch, president; Edward Nicholas Chase, vice-president; Isaac Calhoun of Kent, secretary, and R. R. Spencer of Seattle, treasurer, to start a canvass for raising $1,000,000 for the construction of an interurban railway line.

WATERWORKS.

PASADENA, CAL.—The North Pasadena Water Company has voted to sell to the city its water plant. Other companies voted some weeks ago to sell.

SANTA ROSA, CAL.—The Town Trustees of Cloverdale are expected to expend $1,250 for the enlargement and improvement of the water pumping plant.

SALEM, ORE.—August Nibler has been elected president of the council. Gorvais is to have a $2000 water pressure system installed, if the wishes of the newly elected council prevail.

SAN FRANCISCO, CAL.—The Board of Supervisors has passed the ordinance ordering the construction of pumping station No. 1 of the auxiliary water system at a cost not to exceed $400,000.

CALDWELL, IDAHO.—The order for the new pipe and fittings to replace the wooden pipe now in use has been placed with Gauld & Company, who will furnish the pipe required for $7441.81.

EL PASO, TEX.—A 10-inch well is to be drilled for the purpose of supplying the Texas & Pacific round house with water. W. M. McLeese has the contract for drilling the well, which to be 320 feet.

PASADENA, CAL.—The stockholders election for both the Pasadena Lake Vineyard, Land & Water Company and Pasadena Land & Water Company, voted by large majorities to sell water plants and rights to city.

SPOKANE, WASH.—The Union Works Company of this city has filed a bid of $96,000 for water mains to be part of the extensions in the city's water service, and James McNeil & Brothers of Pittsburg have filed a bid for $140,000.

VALLEJO, CAL.—Sealed bids will be received by the Commissioners of Public Works at their meeting, December 13th, 1909, for furnishing to the water department of Vallejo 480 first class 5-8 inch water meters with connections.

COTTAGE GROVE, ORE.—Taylor & Kurtz have entered into a contract with J. W. Roberts, consulting engineer for the proposed water system from Layng Creek to perform the preliminary engineering under his immediate direction.

LOS ANGELES, CAL.—A contract has been awarded to the United States Cast Iron Pipe & Foundry Company of San Francisco or furnishing and laying 10-inch cast iron pipe from Lake Brown to Home Junction. Contract price, $9580.

NEWPORT, ORE.—Mayor Bensell announces that after the bonds have been advertised and other preliminaries attended to, things will be in readiness for the work on the construction of the new water system for Newport. Work will go ahead all winter on the line.

CATHLAME, WASH.—Sealed bids will be received at the office of the city clerk until 10 o'clock a. m., November 30, 1909, for the furnishing of all material and labor for the construction of the completion of the city water system in accordance with the plans and specifications filed with the city clerk.

FULLERTON, CAL.—Gertrude B. Miller has applied to the City Trustees for a franchise to lay water pipes in or over all public streets and alleys within the city limits for the purpose of carrying water for domestic, agricultural or mechanical purposes. The franchise will be sold on January 10th at 8 p. m. to the highest bidder.

SPOKANE, WASH.—By a contract closed yesterday between the city and the Allis-Chalmers Company of Milwaukee, Wis., Water Commissioner F. P. Weymouth expects to have an abundance of water flowing through the city mains by the first of next May. The contract is for six new pumps and three motors for the up-river pumping station. Price, $33,904.